MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for February, 1899, is based on about 2,762 reports from stations occupied by regular and voluntary observers, classified as follows: 162 from Weather Bureau stations; numerous special river stations; 32 from post surgeons, received through the Surgeon General, United States Army; 2,385 from voluntary observers; 96 received through the Southern Pacific Railway Company; 29 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 31 from Canadian stations; 10 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological and Magnetic Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During the first half of February the most remarkable cold wave, or series of cold waves, in the history of the Weather Bureau traversed the United States from the north Pacific to the south Atlantic coasts, damaging crops and fruits in the Southern States to the extent of millions of dollars. During the first eight days of the month the lowest temperatures on record were reported at points in the north Pacific coast States; from the 9th to the 12th many places in the Central, Western, and Northwestern States reported the coldest weather on record. During the 13th and 14th the cold wave overspread the Southern and Eastern States, attended, on the 13th, by the lowest temperatures on record from the southern Rocky Mountain slope to the south Atlantic coast, by zero temperatures to the Gulf coast of Alabama, and by a snowstorm of unprecedented severity in the Middle Atlantic States.

The visible cause of this period of intense cold is found in a series of barometric depressions in the South, combined with an area of high barometer of great magnitude which persistently occupied the British Northwest Territory until the 11th, inclusive, when the highest sea-level pressure ever reported within the region of observation covered by the Weather Bureau and Canadian services, 31.42 inches, was telegraphed from Swift Current, Assiniboia. After the 11th this area of high barometer settled southward over the eastern Rocky Mountain slope and the central valleys, causing the severest winter weather ever experienced generally over the southern half of the country east of the Rocky Mountains. The meteorological conditions presented by the daily weather maps during the eastern and southern advance of the cold wave are shown on Charts X and XI. It will be observed, by a comparison of these maps with the Weather Bureau forecasts and warnings issued, that ample and timely warning of the advance of the cold wave was given to all interests that were likely to be injuriously affected by intense cold. It will also be noted that special reports and newspaper comments made in connection with the cold-wave visitation give unquestionable evidence that the warnings prompted protective measures, whereby crops, live stock, and perishable goods and merchandise to the value of hundreds of thousands of dollars were saved.

As early as the evening of February 10, Santa Fe, Oklahoma, and stations in the interior of Texas were notified of the approach of a severe cold wave. On the 11th cold-wave signals were ordered for the Texas coast, New Orleans, Mobile, Meridian, Pensacola, Atlanta, and Montgomery, and the warnings were distributed throughout the States represented by the stations named. Jacksonville, Fla., was advised on the 11th that freezing temperature would probably occur over the northern third of Florida Sunday night.

On the morning of the 12th the truck-growing centers about Galveston, Tex., were notified, by telegraph and telephone, that a hard freeze was indicated for Sunday night and that

crops should be given all possible protection. The afternoon papers of New Orleans, issued at 1 p. m., published a special bulletin, in which the citizens of that city were informed that the temperature at New Orleans was likely to fall as low as 6° or 8° above zero, and that without doubt all records for cold weather in New Orleans would be broken Sunday night. Storm signals were displayed along the middle and east Gulf coasts, with warnings of high gales and freezing weather on the Gulf. Emergency warnings, stating that freezing weather would extend as far south as Tampa, were given the most complete distribution that was feasible with the existing telegraph, telephone, and mail facilities of Florida. Storm signals were displayed on the south Atlantic coast; from Wilmington to Eastport signals for northeast gales were ordered; and from New Jersey and Pennsylvania over New York and New England special warnings of heavy snow were telegraphed to all Weather Bureau stations, with instructions to notify railroad and transportation interests.

During the night of Sunday, the 12–13th, the cold wave swept southward to the Gulf of Mexico, breaking all previous low-temperature records in the South and Southwest, as shown in the following table:

Station.	Lowest previous temperature recorded.	Minimum temperature February 13, 1899.	Departure below lowest previous temperature.
Concordia, Kans	−25	−26	1
Dodge, Kans	−20	−24	4
Wichita, Kans	−14	−22	8
Oklahoma, Okla	−11	−18	7
Amarillo, Tex	−14	−16	2
Abilene, Tex	− 5	− 6	1
Palestine, Tex	− 1	− 4	3
San Antonio, Tex	6	4	2
Galveston, Tex	11	6	5
Springfield, Mo	−17	−28	11
Little Rock, Ark	− 5	−12	7
Nashville, Tenn	−10	−12	2
Chattanooga, Tenn	− 7	−10	3
Shreveport, La	1	− 4	5
Vicksburg, Miss	3	zero	3
New Orleans, La	15	7	8
Mobile, Ala	12	− 1	13
Montgomery, Ala	5	− 4	8
Atlanta, Ga	− 2	− 6	4
Savannah, Ga	12	8	4
Jacksonville, Fla	14	10	4

The situation the morning of the 13th was as follows: The line of zero temperature extended to central Louisiana, southern Mississippi, southern Alabama, and central Georgia. At New Orleans a minimum of 6.8° was registered, a reading which was 8.2° lower than any previous record. Throughout the Gulf States the minimum temperatures were 3° to 9° lower than ever before noted. Heavy snow was falling in the Atlantic coast States, the snowfall being particularly heavy in the Potomac Valley and Chesapeake region. In the morning additional warnings were telegraphed to Florida that temperature would be much below freezing again Monday night as far south as Tampa, and possibly freezing as far south as Jupiter, and a warning of a norther for the north coast of Cuba was sent to Havana, Cuba. Along the Atlantic coast from Breakwater to Eastport hurricane warnings, the extreme storm warnings of the Bureau, were displayed. Storm signals were continued southward along the coast to North Carolina. The night of the 13th a further fall in temperature occurred over southern Florida, the morning minimum of the 14th being 29° at Miami.

The following reports from along the line of the advance of the cold wave in the Southern and Southwestern States, where a temperature approaching zero is especially disastrous to live stock and products of the soil, as well as a source of serious discomfort to man, indicate the intensity of the cold experienced and the benefits derived from the warnings:

Galveston, Tex., I. M. Cline, Local Forecast Official, Weather Bureau:

About 800 warnings of a hard freeze Sunday night were distributed by telegraph and telephone Sunday morning, and many truck growers made heroic efforts to protect their crops. Conservative estimates place the value of crops saved as a direct result of the warnings at $100,000. Besides, live stock to the value of $200,000 was given all possible protection, and heavy losses in that direction were averted.

Referring to the warnings distributed throughout western Texas, the Abilene West Texas Sentinel, of February 23, 1899, remarks as follows:

The freeze was by all odds the severest ever known in this part of Texas. The local Weather Bureau office gave out the forecast twenty-four hours in advance of the arrival here of the cold wave. If every one interested, and who received or could have received the information, had taken prompt advantage of the warning there is no telling how much saving in the matter of live stock alone would have resulted. As it was many of our stockmen and farmers who have learned to rely largely on the weather forecasts took steps at once to protect their stock from the cold wave they knew was fast approaching. They didn't act upon the idea that a cold wave might be coming, but they knew it was coming when Mr. Oliver, the Weather Bureau Observer, said so, and went to work accordingly and secured their stock. Where the telegraph and telephone could not be used messengers were sent out to warn people to get ready for the cold wave.

New Orleans, La., Alexander G. McAdie, Forecast Official, Weather Bureau:

On the 12th a special bulletin and a special map were issued giving warning of still colder weather. In telegrams sent to different places in the State it was stated that zero temperature would probably be reached throughout the greater portion of the Gulf States. For New Orleans it was thought that the temperature might fall to about 8° by Monday morning. The lowest temperature recorded at New Orleans was 6.8° on Monday morning. This temperature is the lowest ever recorded in New Orleans by the Weather Bureau. Replies to a letter of inquiry sent to nearly 150 crop correspondents of the Weather Bureau showed that it was impossible to estimate the loss to crops by the freeze, but it is thought that it will amount to several millions of dollars. The early vegetable crop was entirely destroyed, the orange crop was a total loss, and trees were killed, the cane crop was considerably injured, and fruit, aside from oranges, was seriously injured. The freeze benefited the rice land. The evening of the 13th there was one inch of snow on the ground, and ice two inches in thickness had formed.

Montgomery, Ala., F. P. Chaffee, Local Forecast Official, Weather Bureau:

The month of February was not only the coldest of which the Weather Bureau has a record, but in all probability gave, on the 12th and 13th, the lowest temperature ever experienced in this section. The morning of the 13th the minimum at Montgomery was −5°, or 10° lower than any previous record. Several persons were frozen to death and streams that were never known to freeze before were covered with ice. At Montgomery there was sleighing for three days. The Weather Bureau cold-wave warning, which was issued about thirty-six hours in advance of the lowest temperature, was widely distributed, but the cold was so severe that ordinary protective measures availed but little, and the damage to crops and other interests in Alabama will approximate a million of dollars.

Atlanta, Ga., J. B. Marbury, Local Forecast Official, Weather Bureau:

The cold wave was by far the most severe on record. The temperature fell to zero almost to the southern limit of the State, while in the north portions it reached 10° or 12° below zero. The damage to crops in Georgia will amount to several millions of dollars. While the entire State suffered severely the damage was greatest in the southern half, where peaches, as well as a number of young trees, were killed. Grain was generally protected by a covering of snow. Stock suffered, and in some counties cows and goats were frozen to death. The cold spell, though disastrous in many ways, will be of much future benefit. The freezing and thawing will improve the condition of the soil and kill insects injurious to plant life.

Jacksonville, Fla., A. J. Mitchell, Local Forecast Official, Weather Bureau:

Freezing conditions covered the territory set forth in the warnings, and ample time was given all interested to take the necessary precautions. The warning was telegraphed to 118 points, and every possible avenue was utilized to apprize the public of the expected severe weather. Railroads notified fruit and vegetable growers along their lines, cold-wave and frost signals were sounded by locomotives and river steamers, and along the 400 miles of the Florida Coast Line every section was promptly served. The night of the 12th heavy sleet and snow prostrated telegraph lines north and cut off communication with Washington, and on the 13th reports were not received in time to be

of use. With a temperature of 10° at Jacksonville on the 13th, the official in charge sent the following warning throughout the central and southern portions of the State, the sections most vitally affected by a freeze at this time of year: "*Severe freeze to-night throughout the Peninsula. Give widest possible distribution.*" The warning was lodged not only with every station and settlement, but special messengers were sent out by the Florida East Coast Line Railway notifying individuals throughout the extent of their lines. The action of this road was such that every point south of St. Augustine, except Key West, was notified. Other roads showed the same activity. The saving to fruit and vegetable growers was enormous. The methods of protection used varied with the object to be protected. Orange trees were wrapped, banked, and some groves were covered. Additional protection was given by building fires. Pineapple fields were protected by a covering of lattice work under which fires were distributed. In every case through the north and north-central parts of the State the most heroic measures were necessary to save anything. The cold was so severe over the western and parts of the northern districts that cattle, horses, and sheep died from exposure. The lowest temperature reported was 4° below zero over the western district. The temperature fell to 29° in the southern part of Dade County. The vegetable crop over central, northern, and western portions of the State has been destroyed; oats, peaches, and pears damaged, and probably the greater portion of young citrus trees over the north-central counties has been seriously damaged. Citrus trees between latitudes 29° and 28° are thought not to be severely damaged, excepting young growth. Those south of the twenty-eighth parallel will escape with no serious consequences.

The total value of fruit, vegetables, and property saved in Florida, as given by those who were benefited by the warnings, amounts to nearly $60,000. The figures are, however, necessarily incomplete, as many groves were saved whose values are not included in the above estimate.

It is a matter of sincere congratulation that, with the severest freeze in the history of the State and with more property subject to loss or serious damage, the Weather Bureau so met the demands and expectations of the public that not one complaint has been received regarding the accuracy of the forecasts.

The Jacksonville, Fla., Daily Metropolis of February 17, 1899, contained the following editorial:

The splendid service rendered the orange growers of Florida by the weather reports sent out by Director Mitchell of the Weather Bureau predicting the recent extraordinary cold wave, is most highly appreciated by our people, and there is no branch of the Government service to-day that is more favorably commented upon.

The timely warnings sent out by Director Mitchell were heeded by the orange growers, who hastened to protect their trees by burning log fires and taking other precautions, and the result is that millions of dollars were saved to the State.

Mr. Mitchell, the capable director here, has made his office a center of attraction, and he has by arduous work succeeded in establishing reliable correspondents all over the State. He has imparted his enthusiasm to these correspondents, and to-day a better established Weather Bureau can not be found in any State in the Union, and his reports on the condition of the weather and crops are always read with interest, as they are reliable.

In regard to the distribution of warnings along his line of road, Mr. R. T. Goff, Superintendent of the Florida East Coast Line, writes as follows:

The information was received by us about fifteen hours in advance of the cold wave, and was thoroughly distributed to every station on the line of our road, and in the vegetable region messengers were sent out to warn the people of the expected freeze. It is estimated that about half the crop of vegetables was saved by our receiving this warning. I believe the value of the vegetables is estimated at about one million dollars.

The following reports from Weather Bureau officials show that this cold wave was felt as a norther over, probably, the entire area of the Gulf of Mexico, and also on the north coasts of the islands of the Greater Antilles:

Havana, Cuba, William B. Stockman, Forecast Official:

13th. Unusually cold with temperature falling to 54° in the evening. Barometer rose rapidly and rain ended about 4 a. m. Wind veered to northeast 12:30 a. m. and increased to high and continued high until sunset; maximum 36 NW., 12:35 p. m.

Much damage by storm along coast front. The water and waves were the highest known in twenty-five years, and a number of houses were washed away, and many others, including their furniture, damaged or ruined. No estimate of amount of damage can be made. Camps and corrals of United States troops along the ocean front greatly damaged. No lives lost.

14th. Temperature remained below 60° until after 2 p. m., inclusive. Maximum, 54°.

The Times of Cuba, Havana, Cuba, February 14, 1899:

Yesterday winds and waves created sad havoc in many a household on the beach. The huge waves toppled over three houses at the ends of Aguila and Laza streets as if they were egg shells. Several persons in the houses were badly injured. From 6 to 7 in the morning those who live on the beach noticed the increasing height and periods of the waves, and by 8:30 a. m. the water was dashing upon the houses skirting the edge of the shore. The waves mounted higher and higher as the wind became more savage, and for a few hours it seemed as if a small sized cyclone was at work. The day was unusually tempestuous at sea.

Santiago de Cuba, W. I., A. V. Randall, Observer:

The norther of February 13–14 was quite severely manifested in this section, and I have been told by the native inhabitants that it was the severest ever known in this island. Its approach was first felt at about 5 p. m. of the 13th, the wind veering at that time from southwest to northwest, and at 10 p. m. to north, blowing from that time until midnight of 14th at a velocity from 9 to 18 miles per hour, then passing to the northeast, blowing with less force, and finally to southwest again at about noon of 15th.

Beginning with the change of wind to northwest, the temperature fell gradually, reaching the lowest point, 62°, at 3 a. m. of 14th, remaining nearly stationary until 8 a. m., then slowly rising to 74°, the maximum for the day, at 4 p. m. By 11 p. m. of 14th the temperature had nearly regained the normal for that time.

The barometer rose from 29.98 inches at 8 p. m. of 13th, to 30.02 inches at 9 p. m., and remained very nearly stationary until noon of 14th, then fell to 29.98 again at 1 p. m. and continued at about normal during the balance of that day.

Cold wave was preceded and accompanied by rain at intervals between 9:18 a. m. and 8:10 p. m. of 13th.

San Juan, Porto Rico, Mark W. Harrington, Section Director:

There was no sign of the cold wave in our skies or winds or waters, and only a doubtful sign in the fall of our minimum temperatures by a degree or two.

Kingston, Jamaica, R. M. Geddings, Observer:

The norther of the 13–14th was but little felt here, but reports from the north side of the island would seem to indicate that it was felt quite severely in that locality.

The mountain ranges which extend along the east and north of the station at a distance of but a few miles offer such protection that northerly winds attain usually but little force at this point.

Port Antonio, Jamaica, Mr. J. A. Jones, Boston Fruit Company:

We are subject to northers of more or less severity every year. They are not usually productive of much damage, except possibly loss of a few boats which are moored in open roadsteads, and making it rough and uncomfortable shipping fruit.

The norther of the 13th referred to was, perhaps, more severe than usual, but there was no particular damage done. A few surfboats were stranded on the beach and broken up, and one or two small sloops were driven on shore. Some bananas were blown down in different districts, a few here and there, but there was no general blow down in any one locality. There was no damage done to shipping, that is, steamers in the island for produce.

Montego Bay, Jamaica, Mr. Maxwell Hall:

The wind set in from the north-northwest at Montego Bay between 4 and 5 p. m., February 13, 1899, 15 miles per hour, and gradually increased to a maximum of 20 to 25 miles and blew from that direction all through the night with squalls of rain. Two or three lighters went ashore; a fine schooner in the open harbor sailed out (very near the wind) and made Luce a close harbor; but the sea did a great deal of damage to the wharfs which were in bad state of repair. The temperature fell very little. The barometer was high, say 30.10.

News Letter, Kingston, Jamaica:

In consequence of the heavy norther which prevailed at Montego Bay the schooner *Ocean Flamer* had to slip anchor and leave port without clearance. She came on to this port yesterday. She had a narrow escape and had her sails torn and other damage.

Bridgetown, Barbados, P. McDonough, Observer:

Brisk east winds; sharp fall in temperature between 9 and 10 a. m. 15th.

Basseterre, St. Kitts, W. I., George Kingsbury, Observer:

On the 12th the weather was cloudy, a rapid rise in pressure, high easterly winds 30 miles, and a heavy sea swell; 13th, weather clear and conditions normal; 14th, continued heavy sea swell and higher

pressure; brisk easterly winds; 15th, continued high pressure and heavy sea swell, and high easterly winds 30 miles; 16th and 17th high pressure; heavy sea swell and high easterly winds, with velocities of 28 and 30 miles.

Colon, Colombia, Charles F. Tallman, Observer:

On the 13th a moderate storm of the norther type prevailed in the afternoon. The weather became threatening at noon, with a sudden increase in the wind, and a few drops of rain fell. The sky cleared partly at 12:15 p. m., but the wind continued to increase, and after 2:30 p. m. varied between north and northwest, with a velocity of 16 to 20 miles an hour. The sea became high during the evening. The wind decreased somewhat during the night of the 13th, and gradually shifted to northeast during the morning of the 14th, backing to north in the evening. The sea continued high, and steamers left their wharves in the early morning and sought anchorage in the mouth of the harbor.

This was the only disturbance of this type during the present norther season.

The character of the storm along the middle Atlantic and New England coasts is shown by the following reports of observers and remarks by newspapers:

New York, S. L. Mosby, Assistant Observer:

Monday, February 13, a blinding snow storm, in conjunction with vast fields of moving ice, closed New York bay and brought ocean traffic to a full stop.

On Saturday morning, February 11, snow was forecast for Saturday night and Sunday. This forecast was published by the afternoon papers, and again by the Sunday morning papers. At 9:10 p. m. (11th), light snow commenced and continued without intermission during Sunday. At 12 o'clock Sunday (12th), warning of heavy snowfall was received, and the warning was repeated in the morning forecast of Monday, February 13. This warning was sent out Sunday afternoon by telegraph and telephone to all lines of railroad whose interests are centered here.

During Sunday night and Monday heavy snow fell without intermission. Up to midnight Sunday (12th), owing to light winds there had been but little confusion on account of snow, notwithstanding the ground was covered to an average depth of 14 inches. About 4 a. m. Monday (13th), a gale came on from the northeast, which continued with increasing force till 4:30 p. m., when it shifted to northwest and continued throughout the night with hurricane velocity. The snow was very dry, and drifted badly; street traffic, which before had not been interrupted, was maintained with great difficulty, and finally abandoned altogether, with the exception of two cable lines. At 8 p. m. (13th), the conditions were worse. The average depth of snow on the ground was 23 inches, and it drifted to a depth of 6 feet in many places. After 8 p. m. the snowfall became lighter, and ceased during the early morning of February 14, with a fall of 15.6 inches during the storm, and a total depth on the ground of 24 inches.

The railroads received most ample warning of the conditions which prevailed on Monday, but they were powerless in the face of such overwhelming odds.

Monday was very generally observed as a holiday, and all business was suspended. When Tuesday morning came, with clearing weather and a resumption of business, the scene in lower Broadway was one of indescribable confusion. All traffic was confined to the narrow space covered by car tracks, while snow was piled on either side to a depth of 8 feet.

The hurricane winds which prevailed Monday night were forecast in ample time, and every effort was made by the station force to distribute the warning.

It is most gratifying to know that the unprecedented weather conditions which prevailed from February 8 to 13, inclusive, were forecast accurately, in ample time to protect all endangered interests. The cold wave was heralded nearly twelve hours in advance; the beginning of snow about the same length of time; more than twelve hours notice of heavy snow; and about eight hours notice of hurricane winds.

Through the afternoon and evening papers these warnings were given to more than a million people engaged in every field of business interested in, and affected by, weather changes. Full credit has been given the Weather Bureau; and the fact that protection was thus afforded the enormous interests concentrated here, will compensate for many minor failures.

The Times Union of Albany, N. Y., of February 13, 1899:

In accordance with the warning sent out yesterday afternoon by the Weather Bureau, this city is to-day experiencing one of the heaviest snowfalls of the year. It is seldom that the Weather Bureau fails in predicting a big storm, and it has been more than successful this year. At the office of the Central Hudson Railroad this morning it is stated that the warning of yesterday saved them thousands of dollars in getting freight that was of a perishable nature under cover.

Boston, Mass., John W. Smith, Local Forecast Official:

A prompt and thorough dissemination of the warning was made by telegraph, telephone, bulletins, and the press. Especial care was taken to notify all transportation companies and the shipping interests generally. Copies of the message were furnished to officials of the United States Revenue Service, United States Life Saving Service, Light House Service, etc. Great and general interest was manifested. While the wind at this station attained a maximum velocity of only 40 miles from the northeast, it reached hurricane force, and hurricane conditions generally prevailed in the vicinity of this city, especially along the coast. The warnings were timely and fully verified. All shipping remained in port.

Boston Herald, February 15, 1899, editorial:

The Weather Bureau is entitled to distinguished consideration for its services anent the late great storm. It foretold the widespread disturbance with remarkable accuracy, and gave everybody a chance to take a reef.

Portsmouth, N. H. Displayman:

Storm very severe, but shipping was warned in time to prevent sailing. A large number of vessels were notified and remained in harbor, and 13 fishing vessels, manned by crews which aggregated 88, and valued at $21,300, were detained.

Eastport, Me., D. C. Murphy, Observer:

Hurricane signals on the 13th were posted in all conspicuous places in the city, and the railroad and steamboat lines were notified. Two steamers and two steam ferryboats, valued at about $150,000, were the only vessels in port, with cargoes valued at about $25,000, and with crews and passengers numbering about 100 persons. No damage to vessel property is reported. Travel to and from the city was entirely suspended for two days. The snow drifted badly, some drifts being 12 to 15 feet high. The wind reached a velocity of 70 miles from the northeast at 11:30 p. m. on the 13th.

CHICAGO FORECAST DISTRICT.

The severe cold weather which prevailed in the district the last week in January continued during the first half of February, caused by the persistence of high pressure areas of great magnitude in the Western and Northern States and the movement of low areas southward of the district. Temperatures, lower than previously recorded at many stations, occurred on the 8th, 9th, 10th, 11th, and 12th. The continued cold weather was, as a rule, accurately forecasted, and on the the afternoon of the 10th a special bulletin was issued as follows:

Nooh specials show that the cold wave in the extreme northwest is moving rapidly eastward and southward, thus preventing appreciable moderation in the temperature. Severe cold weather will continue several days.

The warnings must have been of great value to the public. Under date of February 12, Mr. J. C. Piercy, North Platte, Nebr., writes:

The norther and cold-wave warnings of the 10th instant were of inestimable benefit to Mr. Max Beer, a ranchman of this city, who had 200 cows and calves, valued at $5,000, on cars and on the road. The warnings enabled him to save them, as they could not have stood the storm. It was 35° below zero this morning, the lowest temperature recorded in twenty-six years.

The shipment of perishable goods was almost entirely suspended for three weeks, not even the most improved refrigerator cars affording safety.

On account of the absence of snow the ground in the vicinity of Chicago was frozen in many places to the depth of five and one-half feet, causing great damage by the freezing up of the water and gas mains and service pipes. Plumbers have been unable to meet the demands for their services, and the exigency has brought forward the novel method of thawing out frozen pipes by the use of an electric current. Great suffering was caused by the severe cold among the poorer classes, and many people were frozen to death. Several steamboats which maintain winter service on Lake Michigan were blocked by the thick ice and unable to reach port for three or four days.

Over the greater portion of the district the weather during the second half of the month has been moderate and even mild, but interrupted by the movement of two cold waves,

the first moving across from the 21st to 24th, and the second on the 26th and 27th. Warnings of these two cold waves were issued well in advance of their approach.

Vesselmen on Lake Michigan were kept fully informed as to the expected movement of storms during the month, and no casualty from stress of weather has been reported.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

From the 2d to the 7th, inclusive, warnings of severe frosts, probably injurious to citrus fruit in exposed places, were issued throughout California. These warnings were fully verified, all Weather Bureau stations reporting heavy or killing frosts on those dates. The usual precautions were taken in the citrus belt to prevent injury, and it is believed that no damage was sustained. There were no important conditions which were not forecasted in due time.—*G. H. Willson, Local Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

River forecasts were issued on the 6th, 7th, 8th, 9th, and 10th, and were most favorably commented upon by people along the water front. The feature of the month was the cold period from the 1st to the 8th. Temperatures of zero and slightly below were reported from a few of the more exposed places west of the Cascades, and zero temperatures were general east of them. In portions of Washington, Oregon, and Idaho the lowest temperature on record was observed; this was especially true in the region about Baker City, Oreg. The accuracy of the forecast during this period was made the subject of much favorable comment. During the last half of the month much damage to grain and orchards was reported; the damage was not, however, as great as estimated. The unusual severity of the weather of the month caused a great demand for information upon the local office.—*B. S. Pague, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

During the month there were six highs and nine lows sufficiently well defined to be traced on Charts I and II. In these charts the center of each circle represents the position of the high or low on the date and hour inscribed within. There is also entered in the circle the reading of the barometer near the center. In many cases this reading is quite approximate, especially when the high or low is on the border of the observation region. It should also be noted that sometimes the center has been located by the direction of the winds about it, and not necessarily by the highest or lowest reading of pressure. This is especially the case in the mountain and Plateau regions.

The principal facts regarding the date and place of first and last appearance, the duration, and velocity of these highs and lows are given in the accompanying table, and the following remarks are added:

Highs.—The month has been remarkable in a good many respects. Nearly the highest pressure ever observed in the United States and Canada, 31.42 inches, was reported at Swift Current on the morning of the 11th, and this was a reinforcement of a high area that had been nearly stationary there, or stretching in a ridge of high pressure in a southeast direction to the middle Mississippi Valley since the morning of the 6th. In connection with this ridge of high pressure extremely low temperature was noted in a rather narrow strip from Montana to the middle Atlantic coast. At Washington a temperature of 15° below zero was experienced at 8 a. m. of the 11th, which was 1° below the lowest ever noted by the Weather Bureau, and this was a radiation cold rather than the cold of a cold wave.

All the highs were first noted to the north of Montana and moved in a southeast direction to the Mississippi Valley, and thence east and northeast to the Atlantic coast. Numbers I and V disappeared off the south Atlantic, II off the middle Atlantic, and the remaining three could be traced to Newfoundland. The severe temperature conditions of the month were mostly in the first half, and were prevalent more in the Southern and Western States than in the Northeast States; at 8 p. m. of the 1st Denver reported a fall in temperature of 48° in twenty-four hours and to —4°, but this cold wave had practically disappeared by the next a. m.; at 8 a. m. of the 7th, in connection with the ridge of high pressure noted above, there was quite a sharp fall in temperature in the middle Gulf States; Mobile had 30° fall in twenty-four hours. This cold spell culminated in Florida at 8 p. m. of the 8th. Jacksonville reported a fall of 40° at 8 a. m. of the 9th. In connection with same ridge the Middle Atlantic States experienced decidedly low temperatures. Atlantic City and New York had a fall of 32°, and Washington a temperature of —6°. The low temperature of this period continued till a. m. of the 11th; at 8 a. m. of 10th Washington reported —8°, and the next morning, —15°.

At 8 p. m. of the 11th, as high III approached the middle Mississippi Valley, Amarillo and Oklahoma reported a fall of 40°, and to —10° and 4°, respectively, and the next a. m. Galveston had a fall of 32° and to 10°. This cold wave moved eastward with the high area, and culminated in Florida on the 13th; at 8 a. m. Jacksonville reported a fall of 38° and to 10°.

As high No. V moved to the middle Mississippi Valley sharp falls in temperature occurred in the Missouri Valley; Moorhead reported a fall of 28°, and to —4° at p. m. of the 26th; at 8 a. m. of the 27th this cold wave reached the lower Lake region, Cleveland reporting a fall of 28° and to 26°.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	*29, a. m.	54	109	2, a. m.	33	78	2,700	4.0	675	28.1
II	7, a. m.	52	108	11, p. m.	41	76	1,980	4.5	440	18.3
III	9, p. m	50	116	17, a. m.	47	56	5,370	7.5	716	29.8
IV	21, p. m.	52	117	27, a. m.	46	58	3,660	5.5	665	27.7
V	24, p. m.	53	118	28, p. m.	32	77	2,730	4.0	682	28.4
VI	27, a. m.	53	110	†3, a. m.	47	59	2,910	4.0	728	30.3
Total							19,350	29.5	3,906	162.6
Mean of 6 paths							3,225		651	27.1
Mean of 29.5 days									656	27.3
Low areas.										
I	1, a. m.	47	126	4, p. m.	45	54	4,470	3.5	1,277	53.2
II	3, p. m.	29	101	6, a. m.	36	75	1,740	2.5	696	29.0
III	5, p. m.	28	95	9, p. m.	49	54	2,790	4.0	697	29.0
IV	8, p. m.	30	107	14, p. m.	48	53	3,690	6.0	615	25.6
V	13, a. m.	32	116	17, a. m.	39	70	2,910	4.0	728	30.3
VI	14, p. m.	51	117	19, p. m.	46	59	2,790	5.0	558	23.3
VII	20, p. m.	37	98	24, a. m.	48	56	2,460	3.5	703	29.3
VIII	23, a. m.	32	115	28, a. m.	47	59	3,420	5.0	684	28.5
IX	26, p. m.	48	124	†1, a. m.	50	62	3,090	2.5	1,236	51.5
Total							27,360	36.0	7,194	299.7
Mean of 9 paths							3,040		799	33.3
Mean of 36 days									760	31.7

*January. †March.

Lows.—Three of the storms were first noted on or near the north Pacific coast, and three more on the south Pacific coast, the remaining three in the west Gulf. The general motion was toward the east and northeast. Seven of the storms dis-

appeared over Newfoundland, and two, No. II and No. V, off the middle Atlantic coast. High winds occurred as follows: At 8 a. m. of 8th, as low No. III approached the New England coast, Block Island reported an east wind of 66 miles an hour. During the 13th, as No. IV moved up the Atlantic coast, Hatteras and Sandy Hook experienced north winds of 60 miles, and the same afternoon Block Island had a north wind of 72 miles, Sandy Hook northwest 60, Boston east 52, Hatteras west 50, Eastport northeast 48, and a northwest wind of 48 miles occurred at Atlantic City, Cape May, and Cape Henry; at 8 a. m. of the 26th, as No. VIII approached upper Lake region (the only severe storm of the month in the Lake region), Chicago reported a south wind of 48 miles.—*H. A. Hazen, Professor.*

RIVERS AND FLOODS.

The Mississippi River remained frozen during the entire month to below Hannibal. From the mouth of the Illinois southward, and in the Missouri east of Kansas City, the stage of water varied but slightly until the 26th and 27th when there was rise of 2 or 3 feet, owing to the heavy rains of the 25th and 26th. The Missouri also remained frozen north of Kansas City, and was likewise frozen at Kansas City from the 1st to the 17th, inclusive.

Rains on the 20th caused a rise to set in along the Ohio, but not to an alarming extent. The crest passed Pittsburg on the 23d, Wheeling on the 24th, Parkersburg on the 25th, Cincinnati on the 27th, and Louisville on the 28th.

In the lower Mississippi the crest of the January rise reached New Orleans on the 3d, but nothing of importance occurred during the month.

The heavy rains of the 3d and 4th resulted in a great rise in the Tennessee and Cumberland rivers. At Carthage, Tenn., on the Cumberland, the water rose 35.2 feet from the 3d to the 8th, reaching 41.7 feet, or 11.2 feet above the danger line. At Nashville the danger line of 40 feet was exceeded by 0.8 foot on the 11th. No losses or damage worth mentioning occurred.

In the Tennessee, however, a very different state of affairs prevailed. The rains were much heavier along this watershed and the rivers generally rose above danger lines, except at Knoxville.

The following extracts relative to this flood are taken from the special report of Mr. L. M. Pindell, Official in charge of the United States Weather Bureau office at Chattanooga, Tenn.:

Heavy rains (3d to 5th) occurred over the Tennessee River watershed, producing a sudden rise of 13 feet in twenty-four hours in the Hiawassee River; 14 feet in the Clinch River at Speers Ferry; 7 feet in the Tennessee at Knoxville, and 3.5 at Chattanooga. On the morning of the 4th the river forecast stated that the Hiawassee would rise slowly Saturday night and Sunday (4th and 5th); the Clinch would rise rapidly Saturday night and slower Sunday, and the Tennessee rapidly till Sunday morning, and slower Sunday afternoon and night, reaching about 20 feet at Chattanooga by Sunday night or Monday morning. Heavy drift began passing down by night of the 4th, with the river rising at the rate of three and one-half tenths per hour. On the morning of the 5th (Sunday), heavy rains with thunderstorms having occurred during the preceding twenty-four hours, and the river having reached the stage of 20 feet ten hours sooner than forecast, with the rise still continuing at the rate of seven and one-half tenths per hour, special reports were called for from the upper river and the following forecasts issued:

"The river (at Chattanooga) will reach 29 feet by Monday morning (actual stage reached, 29.5 feet); the crest from the Clinch will produce a second rise here, and the river will probably reach the danger line Monday night or Tuesday."

River men were notified to protect all property under the 33-foot mark.

As the rains continued, the following supplementary forecast was issued on the morning of the 6th (Monday):

"The Tennessee will continue to rise, reaching the 35-foot stage by Tuesday afternoon. From data in hand at the present time it seems probable that the crest rise will not exceed 37 feet."

On the 7th the forecast stated that the river at Chattanooga would rise steadily, reaching about 38 feet on Wednesday morning (8th). Warnings of this probable 38-foot stage at Chattanooga were also telegraphed to different points as far as Cairo.

Business men were quite uneasy about their goods in cellars, and some were advised to move their stock, which they did, and in no case was unnecessary expense incurred by the merchants. Poor people living in the lowlands consulted the office frequently. Some were advised to move, and others advised to remain and consult the office again on Wednesday morning, as ample notice and time would be given them. No one moved unnecessarily, as was proven afterward by the crest stage attained. The 3 p. m. special bulletin of the 7th showed all rivers rising except the Clinch at Clinton, Tenn., and the following forecast was issued:

"The river will continue to rise to-night, and slower Wednesday. The stage Wednesday morning will be between 37 and 38 feet. The crest rise will occur sometime between Wednesday night and Thursday morning, and will not exceed 40 feet."

The cold wave checked the rise, and at 3 p. m. of the 8th (Wednesday) advisory messages of a falling river were issued. It is estimated that the severely cold weather prevented an additional rise of at least 2 feet.

The property loss from the flood was comparatively small, and none happened that could have been avoided.

Navigation was impeded by heavy drift from the 5th to 10th, and by heavy floating ice from Knoxville to Chattanooga from the 13th to the 16th.

The forecasts were gratifyingly accurate, and the Official in charge at Chattanooga received many exceedingly commendatory notices relative to the work of the Weather Bureau. At Knoxville property to the value of $90,000 was removed and saved. The value of that saved at other places can not be estimated.

The melting of the snow and ice at the headwaters of the Tennessee produced a splendid logging stage, and about 9,500,000 feet of logs were rafted down the river by the end of the month.

At the close of the month the river was again rising on account of heavy rains, and another 20-foot stage was indicated on March 1.

The James River was also in flood from the 17th to 21st, inclusive, particularly in the vicinity of Richmond, and a detailed account by Mr. E. A. Evans, Official in charge of that station, follows:

It is probable that the history of this flood will never be written in a manner which will set forth its various phases exactly as they occurred, or without exaggeration or underestimation. The length of time during which it presented threatening conditions, as well as its rapidly changing aspects, combine to prevent full, accurate justice being done it.

On account of the unusual conditions prevailing for several days prior to the flood, it is deemed advisable, as necessary to a full understanding of subsequent events, to summarize them briefly.

From the beginning of the month the weather was stormy, days with freezing rain, sleet, and snow succeeding each other at short intervals, until the great sleet storm of the 5th to 7th, which, in its turn, was followed on the 11th by a snowstorm lasting fifty-four consecutive hours, and causing a depth on a level of 16 inches, or a total amount of unmelted precipitation on the ground at 8 p. m of the 14th of about 18 inches, inclusive of that which was in evidence prior to the beginning of the blizzard. And neither the sleet nor snow was local, but prevailed with equal energy over the entire basin of the James. At the same time the temperatures ranged unusually low for this section during the period from the 1st to the 17th, with the exception of the 4th to 8th, when they were about normal. Thus both temperature and precipitation seemed to unite to build up by degrees a situation which was pregnant with danger, and which only awaited the coming of rising temperature, thawing southerly winds, and warm rains to materialize from a possibility to an actuality; from an indicated to a present danger. These then were the conditions obtaining up to the morning of the 16th, and it is needless to say that they were regarded with increasing anxiety by this office. As early as the 12th, while the snowstorm was still raging, advisory information was sent out to the various transportation companies, steamboat lines, and individual and corporate interests liable to injury, giving the existing and expected river conditions, and suggesting that all heavy material, freight, etc., be moved to places of safety. From time to time after this date and up to the 16th additional precautionary advice along the same line was issued.

Early in the morning of the 16th, or more precisely, at 7:30 a. m., rain set in with warmer weather, and the unlocking of the frozen

streams and melting of the great mass of snow and sleet was begun. This rain continued throughout the day without intermission, and was heavier, as afterward appeared, in the upper watershed than in the vicinity of this station. Many inquiries were received during the day by telephone from interested persons, as to the probabilities of high water and to all the same information was given. "Outlook very threatening, and material liable to damage should be moved."

At 9:35 p. m. a telegram was received from the observer, Weather Bureau, Lynchburg, Va., "Rainfall one sixty." The day and night passed with gauge readings about stationary.

At 10:14 a. m. of the 17th the special river observer at Columbia, Va., telegraphed as follows: "River 21 feet, rising 8 o'clock, weather cloudy."

Here was the information long and anxiously awaited, coming from a critical point, the key to the local situation. Immediately upon its receipt telephone and messenger were put into use and flood warnings for the upper river from Norwood to Sabot issued, while locally the railroad and water transportation companies and other interests were notified as follows: "The James River will reach a 14-foot stage on the Bureau gauge by 8 p. m. and higher later."

Occasionally throughout the day advisory information was issued. A personal inspection of the river gauge at 11:30 a. m. showed no change in the height of the water as compared with the morning observation, but Superintendent W. T. West of the Southern Railway, whose bridge crosses the river at the point where the gauge is located, was seen and given verbal information of the approaching flood.

Late in the afternoon the river began to rise rapidly, bringing down masses of ice, which, lodging in the shallows at the heads of various islets with which the river is dotted, soon formed the nuclei for the gorge which developed later. Immense quantities of this ice passed under the steel bridge of the Southern Railway, and upon reaching Mayo bridge, about 200 feet below, began to gorge in the channel. This, narrow under the most favorable circumstances, soon choked with the fast accumulating pack, and damming up the waterway backed the river into the cellars and lower floors of buildings in the depressed portions of the city adjacent to the river. By 11 p. m. the gauge reading was 22 feet and the river was nearly level with the under girders of the railway bridge. Ice masses and logs scraped and ground their way under the structure only to pile up immediately below it against Mayo bridge, which at that hour seemed certain of destruction. So great was the press of the jam at this point that the superstructure was lifted and shifted from its position several inches, while heavy oaken beams and other timber work were snapped and crushed.

In the meanwhile, the south or Manchester side of the river was full of floating ice, which, lacking sufficient exit, formed a floe of large dimensions. Backwater gradually lifted it and finally started it down the stream. It passed the south end of the railway bridge without material damage, but massed against Mayo bridge and the plant of the Manchester Paper and Twine Company, doing considerable damage. A span of the bridge was badly wrecked and one of the buildings of the paper company crushed in.

Up to the hour of midnight, when the official in charge went off duty, there was practically no change in the river height, and the ice jam continued to hold the augmentation from small floes coming down from time to time. Early the following morning, 6:30 a. m., the official in charge was again on duty. At this hour the conditions were still unchanged, though less ice was then coming down. The railway officials had the previous night, after consultation with this office, run two freight trains loaded with coal upon the bridge where they remained during the acute phase of the flood. Toward noon a personal examination of the gorges in the north and south channels was made at the request of Superintendent West, who upon report, decided to use dynamite to break through the jam. During the afternoon this plan was put in operation successfully, and by 4 p. m. a free outlet was made to a point just below the Mayo bridge. This at once relieved the pent up condition of the river at and above the gauge, and subsequent readings showed first a rapid and then slow fall in the water level. It proved to be the beginning of the decline from extreme high water reading, 22 feet, but serious conditions still prevailed from below Mayo bridge to the extreme east limits of the city, to floating and wharf property, as well as residence property, in the Shockoe and Rocketts districts. Immense ice fields filled the river in all directions and were of sufficient thickness to almost entirely interrupt its outflow. Gorges were also reported at Chaffins Bluff and Dutch Gap, reliable authority, an official of the U. S. Engineer's Office, giving the former a height of 15 to 30 feet above water. Under these circumstances the subsidence of the flood was unusually slow, and it was not until the 22d that it became low enough to bring the dock again above water. This was brought about by the removal of the jam at, and below, the city.

There were some noteworthy features connected with the flood which deserve mention. First, the fact that the river at Columbia did not, at any time reach 22 feet. Under normal high water conditions this would have given not more than a 14-foot stage at this station. In this case it reached 22 feet locally, a height altogether out of proportion to its true value, and made possible only by the ice jam. Fortunately, warnings of this condition were issued. Second, regular 12-hour fluctuations in the gauge readings at Columbia, a fall and rise due to the daily melting from the Rivanna basin. The amount reaching the stream in this way took about twelve hours to move from the upper courses down to Columbia.

As to the damage done, the greatest was unavoidable; that is, to fixed objects. Much was also done which could have been avoided had the persons interested paid heed to the warnings given them. Others acted on the advice of this office and removed their material to safe places. Among these were the water transportation interests, railroads, business houses, and some individuals. One firm received the warning at 11 a. m. for a 14-foot stage at 8 p. m. They have written this office that at 7:30 p. m. the water entered their warehouse door. The intervening time had, however, been ample, and they saved a quarter of a million pounds of tobacco by intelligent use of the warning.

The damage to floating property was unusually small and in no known instance serious.

The station gauge received some damage from the ice, the full extent of which can not yet be ascertained. It is probable that a new gauge will be needed to replace it.

The North Carolina rivers also rose rapidly from the 7th to the 9th, passing the danger line of 38 feet at Fayetteville, on the Cape Fear River, on the 7th and reaching a stage of 52 feet on the 9th. The rise about the middle of the month also resulted in a stage of 43 feet on the 20th.

The rivers of South Carolina were near or above the danger lines generally from the 6th to the 10th, longer over the lower portions, and ample and accurate warnings were issued regularly after the 5th. Danger lines were again reached after the 17th, and due notice was given at the proper time. No reports of serious loss or damage were received.

The rivers of eastern Alabama were also affected by the heavy rains in early February, and flood stages resulted generally from the 4th to the 11th. Mr. F. P. Chaffee, the Official in charge at Montgomery, Ala., rendered the following special report relative to this flood:

Heavy rains over the drainage area of the Alabama and tributaries on the 3d and 4th, amounting to 2.40 inches during the twenty-four hours ending 8 a. m. of the 4th at Resaca, Ga., and 1.51 during the same time at Tallassee, Ala., started rapid rises in the upper rivers of this section. While the rivers were then at moderate stages (only about 9 feet) at Rome, Ga., and Gadsden, Ala., warnings for rapid rises were telegraphed to these two places on that date, and special reports called for from all river stations for Sunday morning (5th). These special reports showing continued rises in the upper rivers (averaging 6 feet in twenty-four hours) and the rains continuing, a supplemental warning was telegraphed to Gadsden on the 5th for flood stages at that place. Heavy rains continuing over the upper watersheds through the night of the 5th, necessitated further warning to Gadsden on the 6th, when a flood warning was also telegraphed to Wilsonville, and the river observer at Rome was notified of a probable stage of 25 feet at that place. On the 7th additional warnings were sent to Gadsden, Rome, and Wilsonville, and a warning for about a 33-foot stage was telegraphed to Selma. On the 8th the stage of 33 feet, predicted for Selma, was raised to about 36 feet.

On the 7th, warning was widely distributed by telephone and mail that stock and other property, liable to damage, should be moved from lands between Wetumpka and about 100 miles south of Selma, subject to overflow at 30 feet. During the period from 4th to 8th, warnings were also given well in advance of the rises at Wetumpka and Montgomery. All these warnings were widely distributed by telephone, through the local press, and mailed to postmasters at 25 river towns in this section.

At stations for which flood stages were predicted the water went to slightly above the danger line. In no case did the water go above the specific stage forecasted, while the greatest deviation from the stage forecasted was at Selma, where it reached 34.4 feet, or 1.6 foot less than the stage specified.

The fact that the warnings were so well in advance of the high waters, and were so approximately correct, has, it is thought, been the means of maintaining public confidence in this branch of the Bureau's work in this section. While flood stages were attained only from about Wilsonville to Gadsden, still the expense of telegraphing rapid-rise warnings to other points was justified, from the fact that much stock is wintered in the canebrakes of the low grounds of this section, which were all submerged. It is known that the warnings were the means of saving a large number of cattle, which otherwise would have been drowned; the warnings were of special value to the lumber interests of the Coosa River, and were of great use to the railroads in protecting their roadbeds.

High stages also prevailed generally throughout the month in the rivers of western Alabama, the lowest stage at Demopolis for the month having been 25.9 feet on the first day.

A stage of 47.9 feet, 12.9 feet above the danger line, was reached on the 15th, falling to 31.2 feet by the 26th, when another sharp rise set in, continuing at the close of the month. Warnings were issued when necessary, and no damage of consequence resulted.

Nothing of importance occurred along the rivers of the Pacific coast, although the Willamette was above the danger line at Eugene, Oreg., on the 9th and 10th.

ICE IN RIVERS AND HARBORS.

There was ice, either floating or solid, throughout the entire Mississippi watershed. It became solid as far south as Cairo by the 7th, and remained so until the 21st, when it commenced to move. At Chester the gorge broke on the 19th; at St. Louis on the 22d, and at Grafton, Ill., on the 27th. After these dates floating ice, gradually decreasing in quantity, was present until the end of the month.

East of Kansas City the Missouri was practically gorged from the 1st to the 22d, although not actually so east of Hermann, Mo., until the 6th. At St. Louis the ice gorged both above and below the city on the 8th, and on the 9th only a ferryboat channel remained. On the 11th the ice was sufficiently strong for pedestrians and skaters, and on the 12th was from 12 to 16 inches in thickness. The ferryboat channel was opened by tugs on the 17th, and on the 18th the ice was slowly breaking. It began to move on the 20th, and on the 22d moved out with little damage.

At Cairo the Mississippi froze back of the city on the 5th, and railroad ferryboats were working night and day to keep navigation open at the mouth of the Ohio. By the 7th the ice had become solid, and navigation was suspended, not to be resumed until the 22d. On the 13th it was 13 inches thick.

In the Ohio there was ice in greater or less quantities during the major portion of the month, and navigation was suspended from two to ten days at various places. The Allegheny and Monongahela were practically frozen until the 20th. At Freeport, Pa., on the Allegheny River, when the gorge moved out, it carried with it two spans of the Allegheny Valley Railroad bridge.

There was also heavy floating ice in the Tennessee and Cumberland rivers from the 13th until about the 18th.

In the lower Mississippi ice was first observed at Memphis and Helena on the 8th, and navigation was suspended at Memphis on the 10th. On the 14th heavy ice damaged some of the boats in the harbor, and two of them sank. The ice reached Greenville, Miss., on the 11th, and Vicksburg on 12th. From the 13th to the 16th it was very heavy at the latter place, much more so than had ever before been observed. It gorged on the 13th one mile above the city in the main channel, and navigation was suspended. New Orleans was reached on the 17th, and on the 19th floating ice was passing out into the Gulf of Mexico. It ceased at New Orleans on the 20th.

South of Cairo navigation was resumed as follows: at Memphis on the 18th, and at Vicksburg on the 17th.

The Arkansas River was frozen over at Fort Smith from the 11th to the 16th, inclusive, and was free from ice on the 17th. At Little Rock the conditions were, as a whole, unprecedented, and are well described in the following report by Mr. E. B. Richards, the Official in charge of that station:

> The extreme cold which swept over the State, like a breath from the frozen pole, from the 8th to, and including, the 16th, broke all records both as to the minimum temperature and the protracted character of the cold spell. Only once "within the memory of the oldest inhabitant" was it equaled, and that was in "the winter of '63, when the Union forces hauled their cannon across the Arkansas River on the ice," and only once since the establishment of the Weather Bureau in this city was the river frozen over for a greater length of time. The records show but two previous occasions when the river was frozen over. On February 3, 1886, it was frozen over from shore to shore; in February, 1895, it was again frozen from shore to shore from the 7th to the 17th, both dates included.
>
> Floating ice was first observed on the morning of February 7. On the 8th the ice became gorged, about a mile east of the city, about 10 a. m. On the morning of the 9th the river was frozen solid from bank to bank, and continued in this condition until about 9 a. m. of the 17th, when the ice began to break and pass out. Floating ice continued during the 18th and 19th, entirely disappearing on the last-mentioned date. On the 13th the thickness of the ice was 5 inches.

At Newport, Ark., on the White River, there was floating ice from the 8th to the 11th, and a gorge from the 12th to the 16th, inclusive.

In the Atchafalaya River ice from 8 to 14 inches in thickness was running at Melville, La., from 16th to 20th, inclusive.

In the rivers of the East there was ice as far south as Camden, S. C., on the Wateree River, where there was ice and snow on the 13th. At Cheraw, S. C., the Pedee was full of ice on the 16th and 17th.

Thickness of ice in rivers (in inches), winter of 1898–99.

Stations.	December.				January.					February.				March.				April.	
	5.	12.	19.	26.	2.	9.	16.	23.	30.	6.	13.	20.	27.	7.	14.	31.	28.	4.	11.
Moorhead, Minn	13.5	15.0	18.0	20.0	24.0	26.0	26.0	26.0	28.0	32.0	38.0	42.0	42.0	.....	.....	.....	.....	.....	.....
St. Paul, Minn	10.0	14.0	16.0	18.0	22.0	23.5	22.5	22.5	24.5	28.0	30.0	25.0	23.0	.....	.....	.....	.....	.....	.....
La Crosse, Wis	6.5	*	13.0	14.0	15.0	20.0	22.0	19.0	26.0	27.0	32.0	22.0	20.0	.....	.....	.....	.....	.....	.....
Dubuque, Iowa	8.0	10.0	11.0	10.0	14.0	15.0	13.0	10.0	18.0	20.0	27.5	22.0	18.0	.....	.....	.....	.....	.....	.....
Davenport, Iowa	.....	1.0	11.0	11.0	12.5	14.0	13.0	12.0	14.0	14.5	21.5	21.5	21.0	.....	.....	.....	.....	.....	.....
Keokuk, Iowa	.....	7.0	8.5	10.0	14.0	13.0	12.0	11.0	13.0	15.0	26.0	15.0	10.0	.....	.....	.....	.....	.....	.....
Hannibal, Mo	.....	7.0	9.0	6.0	*	11.0	.....	.....	5.0	11.0	16.0	10.0	9.0	.....	.....	.....	.....	.....	.....
Williston, N. Dak	12.0	12.0	12.0	12.0	16.0	18.0	20.0	20.0	21.0	32.0	32.0	32.0	32.0	.....	.....	.....	.....	.....	.....
Bismarck, N. Dak	10.0	16.0	18.0	18.0	20.0	20.0	24.0	24.0	*	27.0	34.0	30.0	30.0	.....	.....	.....	.....	.....	.....
Pierre, S. Dak	11.0	14.0	14.5	15.0	17.0	19.5	19.0	17.5	20.0	23.0	25.0	18.0	14.0	.....	.....	.....	.....	.....	.....
Yankton, S. Dak	8.0	11.5	15.5	15.5	16.0	16.0	16.0	16.0	18.5	21.5	26.0	25.0	25.0	.....	.....	.....	.....	.....	.....
Sioux City, Iowa	8.5	12.0	12.0	11.0	15.0	16.5	17.5	16.5	18.0	21.0	24.0	17.0	19.0	.....	.....	.....	.....	.....	.....
Omaha, Nebr	6.0	8.0	10.0	10.0	*	12.0	*	6.0	10.0	14.0	22.0	20.0	20.0	.....	.....	.....	.....	.....	.....
Topeka, Kans	....	2.5	3.0	2.5	4.0	.....	.....	.....	3.5	11.0	15.0	4.0	6.0	.....	.....	.....	.....	.....	.....
Kansas City, Mo	.....	.....	.....	.....	.....	.....	.....	.....	3.0	8.0	13.0	.....	.....	.....	.....	.....	.....	.....	.....
Wichita, Kans	.....	3.0	.....	.....	.....	.....	.....	.....	4.0	.....	12.0	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburg, Pa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.4	.....	.....	.....	.....	.....	.....	.....	.....
Parkersburg, W. Va	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.0	.....	.....	.....	.....	.....	.....	.....	.....
Columbus, Ohio	.....	8.0	8.0	5.0	0.5	2.5	.....	.....	4.0	6.0	8.0	6.0	.....	.....	.....	.....	.....	.....	.....
Memphis, Tenn	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.5	1.0	.....	.....	.....	.....	.....	.....	.....	.....
Fort Smith, Ark	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.0	.....	.....	.....	.....	.....	.....	.....	.....
Little Rock, Ark	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.0	.....	.....	.....	.....	.....	.....	.....	.....
New Orleans, La	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	.....	.....	.....	.....	.....	.....	.....	.....
Brattleboro, Vt	2.0	2.5	6.5	*	8.0	10.0	9.0	11.0	13.0	17.0	18.5	18.0	17.5	.....	.....	.....	.....	.....	.....
Concord, Mass	2.0	3.0	*	*	11.0	*	*	12.0	15.0	16.0	*	22.0	17.0	.....	.....	.....	.....	.....	.....
Albany, N. Y	.....	.....	5.0	3.0	6.5	1.0	6.0	8.0	10.0	9.5	11.0	9.0	8.5	.....	.....	.....	.....	.....	.....
New Brunswick, N. J	.....	.....	.....	.....	1.5	.....	.....	.....	.....	5.0	8.0	13.0	.....	.....	.....	.....	.....	.....	.....
Harrisburg, Pa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.0	12.0	.....	.....	.....	.....	.....	.....	.....
Lynchburg, Va	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5.0	.....	.....	.....	.....	.....	.....	.....	.....
Richmond, Va	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6.0	2.0	.....	.....	.....	.....	.....	.....	.....
Columbia, S. C	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0	.....	....	.....	.....	.....	.....	.....	.....

* Missing.

The James at Richmond was gorged from the 13th to the 21st, inclusive, and the Potomac at Harpers Ferry from the 10th to the 21st, inclusive.

At Williamsport, Pa., the Susquehanna was frozen over from the 7th to the 22d, inclusive, the ice going out below the dam on the 23d. At Harrisburg the river was closed from the 9th until the 23d, when the ice went out gradually without causing any damage.

At Albany, N. Y., the ice harvest ceased by the end of the month. All was cut that could be handled, and the crop was unexcelled both as to quality and quantity.

Considerable inconvenience was also caused by the ice in the Columbia River on the north Pacific coast. At Umatilla there was floating ice from the 1st until the 15th, and at The Dalles navigation was suspended on the 3d by ice, which blocked the river until the 16th. Navigation was resumed on the 17th, and by the 19th the river was clear of ice. At Portland there was much floating ice in the Columbia on the 4th, and on the 5th navigation above the mouth of the Willamette was suspended owing to ice. The Willamette was frozen over a short distance above the railroad bridge on the 5th and 6th, but not enough to impede navigation. The ice began to break in the Columbia on the 8th, and on the 9th it had also disappeared from the Upper Willamette. On the 14th boats were again running on the Columbia, although there was still considerable ice.

The intensification of the winter conditions and their unprecedented extension southward to the Gulf of Mexico can be seen in the preceding table, which shows the thickness of the ice in the rivers for each week since December 5, 1898.

On February 6 there was $\frac{1}{2}$ inch of ice at Memphis; by the 13th this had increased to 1 inch and had extended to New Orleans, where there were 2 inches, a record unparalleled in the history of the city, as far as is known.

At Moorhead, on the Red River of the North, there was an increase during the month of 14 inches, from 28 to 42 inches. In the Upper Mississippi there was a gradual decrease in the amount except at Davenport and Hannibal, where there were increases of 7 and 4 inches, respectively. In the Missouri the changes were irregular, but, as a whole, there was more ice at the close of the month, except at Pierre, where there was a loss of 6 inches. The greatest thickness in the Missouri was found at Williston, where it was 32 inches, while at Omaha there were 20 inches.

The highest and lowest water, mean stage, and monthly range at 115 river stations are given in the accompanying table. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: St. Louis, Cairo, Memphis, and Vicksburg, on the Mississippi; Cincinnati, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Heights of rivers referred to zeros of gauges, February, 1899.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,957	14	Frozen					
Reads Landing, Minn	1,887	12	— 0.4	1,21-24,28	—0.6	8-13,15-19	—0.5	— 1.0
La Crosse, Wis	1,822	12	Frozen					
North McGregor, Iowa	1,762	18	3.6	28	1.0	1, 13, 14	1.9	2.6
Dubuque, Iowa	1,702	15	Frozen					
Leclaire, Iowa	1,612	10						
Davenport, Iowa	1,596	15	Frozen					
Galland, Iowa	1,475	8	Frozen					
Keokuk, Iowa	1,466	14	Frozen					
Hannibal, Mo	1,405	17	Frozen					
Grafton, Ill	1,307	23	10.2	28	2.9	2	4.6	7.3
St. Louis, Mo	1,264	30	13.6	28	— 0.7	1	5.0	14.3
Chester, Ill.[1]	1,189	36	8.8	28	—1.3	2	2.8	10.1
Cairo, Ill	1,078	45	33.9	15	20.2	6	27.7	13.7
Memphis, Tenn	843	33	24.3	1	14.0	7,8	19.8	10.3

Heights of rivers referred to zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Con.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Helena, Ark	767	42	36.1	1	22.6	10	29.3	13.5
Arkansas City, Ark	635	42	40.2	1	28.0	12	32.9	12.2
Greenville, Miss	595	42	34.6	1	23.4	12	27.9	11.2
Vicksburg, Miss	474	45	39.6	1,2	28.5	14	33.4	11.1
New Orleans, La	108	16	14.3	3,7,8	11.5	19	13.0	2.8
Arkansas River.								
Wichita, Kans	720	10	1.9	9	1.4	28	1.6	0.5
Fort Smith, Ark.[2]	345	22	10.9	28	3.0	10	4.5	7.9
Dardanelle, Ark.[3]	250	21	4.8	28	2.1	9-11	3.1	2.7
Little Rock, Ark.[4]	170	23	7.5	28	4.0	18	4.9	3.5
White River.								
Newport, Ark	150	26	15.7	28	3.4	15	6.8	12.3
Des Moines River.								
Des Moines, Iowa	150	19	Frozen					
Illinois River.								
Peoria, Ill	135	14	10.6	28	3.3	19-21	6.9	5.3
Missouri River.								
Bismarck, N. Dak	1,201	14	4.6	9-11	3.7	22, 23	4.2	0.9
Pierre, S. Dak	1,006	14	Frozen					
Sioux City, Iowa	676	19	Frozen					
Omaha, Nebr	561	18	Frozen					
St. Joseph, Mo	373	10	2.9	9	0.7	1,2	1.8	2.0
Kansas City, Mo.[5]	280	21	7.7	27,28	7.0	18	7.4	0.7
Boonville, Mo	191	20	12.2	27	4.2	4	6.7	8.0
Hermann, Mo.[6]	95	24	10.5	27	1.6	3	4.9	8.9
Ohio River.								
Pittsburg, Pa	966	22	14.7	23	2.3	3, 12, 16	6.7	12.4
Davis Island Dam, Pa	960	25	14.1	23	9.2	7	7.9	4.9
Wheeling, W. Va.[7]	875	36	20.6	24	5.1	3	11.7	15.5
Parkersburg, W. Va.[1]	785	36	20.9	25	6.0	14	12.3	14.9
Point Pleasant, W. Va	703	39	27.9	24	6.0	16	16.8	21.9
Catlettsburg, Ky	651	50	36.0	8	7.5	17	23.2	28.5
Portsmouth, Ohio	612	50	36.5	8	8.7	17	23.4	27.8
Cincinnati, Ohio	499	50	39.4	27	11.5	18	25.9	27.9
Louisville, Ky	367	28	15.9	28	6.8	18	10.7	9.1
Evansville, Ind	184	35	33.0	28	13.8	19	23.3	19.2
Paducah, Ky	47	40	33.0	14	19.5	5,6	26.1	13.5
Allegheny River.								
Warren, Pa	177	7	4.1	24	0.8	10, 14, 19	1.6	3.3
Oil City, Pa	123	13	6.2	23	1.3	13-16	2.2	4.9
Parkers Landing, Pa[13]	73	20	5.6	28	1.2	9	1.5	4.4
Freeport, Pa	26	20	13.0	22	1.3	14-17	5.3	11.7
Conemaugh River.								
Johnstown, Pa.[8]	64	7	5.2	22	2.0	10	3.0	3.2
Red Bank Creek.								
Brookville, Pa	35	8	1.9	22	0.7	1-21	0.8	1.2
Beaver River.								
Ellwood Junction, Pa	10	14	6.5	23	1.3	3	2.1	5.2
Cumberland River.								
Burnside, Ky	434	50	45.6	6	4.9	2, 16	16.3	40.7
Carthage, Tenn	257	30	41.7	8	6.0	16	19.3	35.7
Nashville, Tenn	175	40	40.8	11	10.5	3	24.5	30.3
Great Kanawha River.								
Charleston, W. Va	61	30	19.9	6	4.6	3	9.7	15.3
New River.								
Hinton, W. Va	95	14	9.0	6,7	2.0	15	4.8	7.0
Licking River.								
Falmouth, Ky.[9]	30	25	11.5	6	4.5	2	8.5	7.0
Miami River.								
Dayton, Ohio	69	18	5.5	27	1.9	6,7	2.7	3.6
Monongahela River.								
Weston, W. Va	161	18	7.5	4	0.0	2, 15	1.8	7.5
Fairmont, W. Va	119	25	13.5	4	1.7	2,3	5.3	11.8
Greensboro, Pa.[10]	81	18	16.0	5	7.5	2,3	10.1	8.5
Lock No. 4, Pa	40	28	22.0	5	8.0	2, 12-16	12.0	14.0
Cheat River.								
Rowlesburg, W. Va.[11]	36	14	9.0	4	4.0	26	5.5	5.0
Youghiogheny River.								
Confluence, Pa	50	10	7.5	27	1.6	15, 16	3.8	5.9
West Newton, Pa[13]	15	23	11.0	4	3.0	9	3.0	8.0
Muskingum River.								
Zanesville, Ohio	70	30	14.7	28	7.0	3	9.7	7.7
Tennessee River.								
Knoxville, Tenn			23.1	7	0.6	1,2	6.6	22.5
Kingston, Tenn	534	25	26.1	8	2.4	2,3	9.3	23.7
Chattanooga, Tenn[1]	430	33	38.2	9	5.4	3	16.2	32.8
Bridgeport, Ala	390	24	26.7	10	3.9	1	12.5	22.8
Florence, Ala	220	16	20.5	14	4.5	1	12.8	16.0
Johnsonville, Tenn	94	21	29.6	17	7.7	2	20.9	21.9
Clinch River.								
Speers Ferry, Va	156	30	16.0	6	0.3	1,2	4.2	15.7
Clinton, Tenn	46	25	28.0	6,7	5.3	2	13.0	22.7
Wabash River.								
Mount Carmel, Ill.[12]	50	15	15.2	28	5.5	22, 23	9.0	9.7
Red River.								
Arthur City, Tex	688	27						
Fulton, Ark	565	28	5.8	1	3.0	15	4.2	2.8
Shreveport, La	449	29	11.5	1	3.8	27	6.5	7.7
Alexandria, La	189	33	16.8	1	7.2	26	10.7	9.6
Atchafalaya Bayou.								
Melville, La	100*	31	31.2	2-6	28.2	17	29.6	3.0
Ouachita River.								
Camden, Ark	340	30	14.8	28	7.0	18	9.7	7.8
Monroe, La	100	40	32.3	5	25.0	28	29.6	7.3
Yazoo River.								
Yazoo City, Miss	80	25	20.0	6,7	17.3	15, 16, 25	18.5	2.7
Flint River.								
Albany, Ga	80	20	21.8	15	8.3	1	13.7	13.5
Cape Fear River.								
Fayetteville, N. C	100	38	52.0	9	10.0	15	27.7	42.0
Columbia River.								
Umatilla, Oreg	270	25	4.1	22	0.8	12	2.3	3.3
The Dalles, Oreg	166	40	7.0	23	2.2	9	5.2	4.8

Heights of rivers referred to zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger line on gauge.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Willamette River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Albany, Oreg	99	20	18.4	11	4.1	7	8.6	14.3
Portland, Oreg	10	15	11.7	12	2.4	6	6.8	9.3
Edisto River.								
Edisto, S. C	75	6	6.5	13	5.0	1,2	5.8	1.5
James River.								
Lynchburg, Va.[8]	257	18	7.5	28	1.3	2,3	4.2	6.2
Richmond, Va	110	12	22.0	18	0.2	1	6.6	21.8
Alabama River.								
Montgomery, Ala	265	35	33.0	28	13.0	1	21.2	20.0
Selma, Ala	212	35	34.4	11	10.8	1	24.6	23.6
Coosa River.								
Rome, Ga	225	30	24.0	8	5.0	14,15	11.7	19.0
Gadsden, Ala	144	18	21.5	8	6.7	1,16	13.4	14.8
Tombigbee River.								
Columbus, Miss	285	33	21.0	8	3.8	1	9.9	17.2
Demopolis, Ala	155	35	47.9	15	25.9	1	39.4	22.0
Black Warrior River.								
Tuscaloosa, Ala	90	38	51.7	8	18.5	22,26	29.9	33.2
Pedee River.								
Cheraw, S. C	145	27	34.9	8	5.5	15	18.4	29.4
Black River.								
Kingstree, S. C	60	12	11.6	19–21	8.8	4,5	10.3	2.8
Lumber River.								
Fairbluff, N. C	10	6	7.5	15	4.9	1,3	6.6	2.6
Lynch Creek.								
Effingham, S. C	35	12	17.2	12	8.6	1,2	12.8	8.6
Potomac River.								
Harpers Ferry, W. Va	170	16	13.6	23	2.6	5–14	5.3	11.0
Roanoke River.								
Clarksville, Va	155	12	9.9	7	2.0	1	5.8	7.9
Sacramento River.								
Red Bluff, Cal	241	23	4.1	21,22	0.6	10	2.5	3.5
Sacramento, Cal	70	25	14.1	1	11.6	15–19	12.3	2.5
Santee River.								
St. Stephens, S. C	50	12	15.3	15	8.0	3–8	10.4	7.3
Congaree River.								
Columbia, S. C	37	15	21.3	8	1.8	4	7.6	19.5
Wateree River.								
Camden, S. C	45	24	31.0	8	8.0	4	17.5	23.0
Savannah River.								
Augusta, Ga	130	32	30.9	8	11.5	26	17.8	19.4
Susquehanna River.								
Wilkesbarre, Pa	178	14	12.0	24	5.2	20,21	7.5	6.8
Harrisburg, Pa	70	17	9.0	28	1.9	3	4.6	7.1
Juniata River.								
Huntingdon, Pa[14]	80	24	7.0	27	4.3	21,22	5.1	2.7
W. Br. of Susquehanna.								
Williamsport, Pa	35	20	8.3	28	2.3	14,15	3.6	6.0
Waccamaw River.								
Conway, S. C	40	7	8.4	28	4.9	5–7	6.3	3.5

* Distance to Gulf of Mexico. [1] Record for 27 days. [2] Record for 22 days. [3] Record for 24 days. [4] Record for 19 days. [5] Record for 11 days. [6] Record for 12 days. [7] Record for 25 days. [8] Record for 20 days. [9] Record for 21 days. [10] Record for 26 days. [11] Record for 13 days. [12] Record for 7 days. [13] Record for 16 days. [14] Record for 8 days. [15] Record for 14 days.

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

The overshadowing event of the month was the severe and widespread cold lasting from January 26 to February 14, and culminating in a freeze that for duration and severity stands unparalleled in the history of the Weather Bureau.

Strictly speaking, there were at least two, possibly three, separate and distinct cold waves, each of which followed a course somewhat different from that of the others. The cold was doubtless greatly intensified by the snow covering of the northeastern Rocky Mountain slope and other regions to the eastward.

As stated in the January MONTHLY WEATHER REVIEW, page 5, a succession of snowstorms, accompanied by high winds, swept southeastward from the Northwest Territories during the closing days of January, carrying the snow covering to northern Texas, and cold weather to the Gulf and Atlantic coasts. During this period the Rocky Mountains seemed to act as an effective barrier to the movement of cold air westward over the Plateau region. On February 1, however, a low moved inland from the Pacific, striking the continent about latitude 45°, and moving thence southeastward over the Great Basin and around southern New Mexico to southwest Texas. The passage of this low into the interior appears to have been the key move to the changes that rapidly followed.

Close upon the retreating low an area of high pressure and cold weather advanced from Alberta, crossing to the western side of the Rocky Mountains and settling over the northern Plateau, where it remained almost stationary until the 7th. The temperature fell throughout the Plateau region and on the Pacific coast on the 3d, 4th, 5th, and 6th, the lowest points reached being within a degree or so of the lowest temperatures previously recorded. The minimum temperature at San Diego was 33.5°, lowest previous minimum 32°, while at Cuyamaca Dam, only 60 miles distant, but in the mountains, the temperature fell to 5° below zero. Heavy snows fell in the middle Plateau and Rocky Mountain regions on the 7th, thus reinforcing the heavy covering of snow already upon the ground.

A second high appeared over Assiniboia on the 7th, moving southeastward and the plateau high began an eastward movement, uniting with it on the 8th. This second high, however, apparently remained stationary north of Montana from the 8th to the 11th; pressure gradually increased until the morning of the last-named date, when a maximum of 31.42 inches was reached at Swift Current. In the mean time an offshoot had moved southeastward over the upper Mississippi Valley, the Ohio Valley, the lower lakes, and the Middle Atlantic States, reaching the Atlantic coast in the vicinity of Chesapeake Bay on the morning of the 11th and causing extremely low temperatures in its course, in many cases the lowest recorded in the last twenty-eight years.

On the morning of the 11th, the high which had been apparently stationary over Assiniboia for three days began its southeastward movement, reaching the Texas coast by 10:00 a. m. of the 12th as a violent norther, with temperature 3° lower than ever before recorded. Moving rapidly eastward, it passed successively over the Gulf States, reaching the Florida Peninsula by the morning of the 13th, and thence northeastward along the Atlantic coast, but after reaching Virginia the minimum temperatures were not so low as those of the 10th, 11th, and 12th. We have thus seen that there were three separate and distinct periods of cold and that all sections of the country were visited, except Arizona and a portion of New Mexico on the southwest and portions of the Lake region and New England on the northeast.

The minimum temperatures recorded in the several States and Territories are shown in Tables I and II and graphically on Chart VI. A word of explanation in regard to minimum temperatures registered at Weather Bureau stations in large cities may be appropriate. Generally, Weather Bureau thermometers are installed at a height of 10 to 15 feet above the roofs of high buildings; rarely over sod at an elevation of from 10 to 20 feet above ground. When there is little or no movement of wind, especially at night, the colder air settles in the lowlands and valleys. It may easily happen in such cases that a thermometer on the top of a high building is entirely above the layer of cold air near the surface of the ground.

Thermometers exposed on the tops of buildings in large

cities, moreover, respond to a slight increase in temperature due to the consumption of large quantities of fuel and doubtless to a local heating of the building over which they are placed. The effect on the minimum thermometer must be most appreciable on those buildings in which fires are kept up all night and we should, therefore, expect that the nocturnal readings would be higher than those reported from voluntary stations in the neighborhood. The differences in the minimum readings will vary, of course, according as the building is kept at a uniform temperature or allowed to grow cool during the night. Still another feature should be taken into consideration, viz, the relation of the Weather Bureau building to the topography of the ground for several miles around the station. The effect of topography in general is to lower the night temperatures at stations situated in valleys or natural amphitheaters as compared with those located on the surrounding hills or plains. The City of Washington is a fair illustration of the valley station and it may be compared with Baltimore as a neighboring plains station. The annual means of the two stations are almost identical, Baltimore being three-tenths of a degree warmer. The minimum temperatures registered at Washington, however, are almost invariably lower than those registered at Baltimore. Prior to the current month the lowest minimum temperatures were, Washington, —14° in 1881; Baltimore, —6° in the same year. These values were increased by 1° during the current month, viz, to —15° at Washington and to —7° at Baltimore. The lower minimum temperatures of Washington are believed to be largely the result of topographic influence. The minimum temperatures recorded in the neighborhood of Washington during the current month were: United States Naval Observatory, about 2 miles northwest of the Weather Bureau building and nearly 200 feet higher, —15; Great Falls, Md., about 16 miles northwest in the Potomac River Valley, —14°; Alexandria, Va., about 5 miles southwest, —12°; Laurel, Md., about 18 miles northeast, —18°. In all cases the altitude of the thermometers was less than 15 feet above ground, and it is to be noticed that the minimum temperatures in this city were about as low as those of the country nearby. In the suburbs of Baltimore the minimum temperatures ranged from 4° to 6° lower than was recorded at the Weather Bureau office, and we are of opinion that these figures express about the average difference between the minimum temperatures of Weather Bureau thermometers placed on the roofs of tall buildings and those exposed in the open country from 10 to 20 feet above the ground, other things being equal. Minimum temperatures of 25° below zero were observed at several places between Washington and Baltimore, but the accuracy of the thermometers at low temperatures is not known.

These cold waves established many new landmarks or datum points for future reference, whether we consider the instrumental readings or the physical phenomena resulting from the cold. The most striking of the latter perhaps was the flow of ice down the Mississippi River on the 17th, past New Orleans and into the Gulf of Mexico, an event never before witnessed within the memory of man. Ice an inch thick formed at the mouth of the Mississippi in East and Garden Island bays, and the temperature fell to 10° on the 13th.

The swift flowing streams of the Southern States were covered with ice, and great numbers of fish were killed by the extreme cold. Game birds perished in large numbers, poultry and domestic animals suffered greatly, and in some cases froze to death on account of insufficient shelter. The loss of live stock on the plains and in the great grazing States is not known, but it must have been large by reason of the depth of snow and the duration of the low temperatures.

The loss of human life, from January 29 to February 13, by freezing and avalanches (in Colorado), as near as can be ascertained, was 105 persons distributed as follows:

Colorado, 24; Texas, 15; Pennsylvania, 11; New York, 10; Illinois, 8; Missouri, 6; Ohio, 3; Maryland, 3; Iowa, 4; Wyoming, Delaware, Virginia, North Carolina, Alabama, Arkansas, Kentucky, South Carolina, and New Jersey, 2 each; Washington and Georgia, 1 each.

The usual accompaniments of blizzard weather, viz, snowbound trains, delayed travel, interrupted communication of all kinds and unusual suffering among the poor were present in greater or less degree from the Lakes to the Gulf, and generally from the Atlantic to the Pacific. Schools were generally closed; the usual functions of both city and country life were greatly deranged; and food and fuel famines were threatened in many of the larger cities.

The money loss occasioned by the storms aside from the loss of prospective crops can not be easily computed. Municipalities and transportation companies paid large sums of money to remove the snow, but these expenditures can scarcely be classed as losses pure and simple. Undoubtedly the greatest financial loss fell upon shipping and stock raising interests.

The distribution of the observed monthly mean temperature of the air is shown by red lines (isotherms) on Chart VI. This chart also shows the maximum and the minimum temperatures, the former by black and the latter by dotted lines. As will be noticed, these lines have been drawn over the Rocky Mountain Plateau region, although the temperatures have not been reduced to sea level; the isotherms relate, therefore, to the average surface of the country in the neighborhood of the various observers, and as such must differ greatly from the sea-level isotherms of Chart IV.

The average temperatures of the respective geographic districts, the departures from the normal of the current month and from the general mean since the first of the year, are presented in the table below for convenience of reference:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	24.5	— 2.7	— 2.2	— 1.1
Middle Atlantic	12	27.9	— 6.6	— 6.6	— 3.3
South Atlantic	10	44.0	— 5.5	— 5.3	— 2.6
Florida Peninsula	7	61.0	— 2.9	— 1.6	— 0.8
East Gulf	7	45.2	— 9.3	—10.1	— 5.0
West Gulf	7	41.1	—10.4	— 9.8	— 4.9
Ohio Valley and Tennessee	12	27.4	—10.6	—10.2	— 5.1
Lower Lake	8	21.2	— 5.3	— 5.1	— 2.6
Upper Lake	9	12.8	— 6.3	— 6.8	— 3.4
North Dakota	7	0.2	— 6.0	— 2.2	— 1.1
Upper Mississippi	11	16.4	— 9.7	— 6.8	— 3.4
Missouri Valley	10	14.5	— 9.8	— 4.8	— 2.4
Northern Slope	7	8.6	—12.2	— 8.0	— 4.0
Middle Slope	6	20.3	—12.1	— 9.1	— 4.6
Southern Slope	5	30.3	—11.3	—10.7	— 5.4
Southern Plateau	13	44.0	— 0.8	— 1.2	— 0.6
Middle Plateau	9	30.0	— 1.3	+ 3.2	+ 1.6
Northern Plateau	11	24.1	— 4.4	+ 0.4	+ 0.2
North Pacific	9	39.5	— 1.6	+ 0.3	+ 0.2
Middle Pacific	5	49.2	0.0	+ 2.8	+ 1.4
South Pacific	4	53.2	— 0.2	+ 3.1	+ 1.6

In Canada.—Professor Stupart says:

Temperature was below average in all portions of Canada, except along the St. Lawrence Valley, between Montreal and Father Point, where it was from average to 1° above. From the coast line of British Columbia to the Lake region, the amount below average was very considerable, and this was especially the case over southern Alberta and also in Assiniboia, where the deficiency was as much as from 9° to 12°.

PRECIPITATION.

The numerical values of total precipitation and total depth of snowfall are given in Tables I and II, and the geographic distribution is graphically shown on Charts III and VIII. The depth of snow on the ground is also shown on Chart IX.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	3.80	106	+0.2	+0.1
Middle Atlantic	12	5.13	154	+1.8	+1.4
South Atlantic	10	6.40	173	+2.7	+2.5
Florida Peninsula	7	4.80	171	+2.0	+3.8
East Gulf	7	4.28	91	−0.4	−0.2
West Gulf	7	1.78	53	−1.6	−0.5
Ohio Valley and Tennessee	12	3.49	83	−0.7	−0.6
Lower Lake	8	1.92	71	−0.8	−1.1
Upper Lake	9	0.92	48	−1.0	−1.8
North Dakota	7	0.16	24	−0.5	−0.7
Upper Mississippi	11	1.66	89	−0.2	−0.8
Missouri Valley	10	0.91	69	−0.4	−1.0
Northern Slope	7	0.70	117	+0.1	+0.2
Middle Slope	6	0.46	61	−0.3	−0.8
Southern Slope	6	0.15	13	−1.0	−1.7
Southern Plateau	13	0.28	32	−0.6	−0.8
Middle Plateau	9	1.33	118	+0.2	−0.1
Northern Plateau	11	1.45	88	−0.2	−0.1
North Pacific	9	7.98	129	+1.8	+4.8
Middle Pacific	5	1.14	28	−3.0	−2.5
South Pacific	4	0.16	6	−2.5	−2.1

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 22. Arkansas, 21, 25. California, 1, 2, 8, 15, 24. Florida, 22. Georgia, 22. Indiana, 26. Louisiana, 2, 23, 26. Michigan, 26. Mississippi, 26. Ohio, 26. Oklahoma, 25. Tennessee, 3. Texas, 15, 24. Washington, 21, 27, 28.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 4, 7, 8, 11, 12, 15. Arizona, 5, 6. Arkansas, 2, 3, 4, 5, 6, 14, 15, 18, 19, 25, 26, 27. California, 1, 2, 3, 28. Colorado, 10, 16, 21. Connecticut, 3, 8, 13, 16, 17, 20, 25, 26, 27. Delaware, 5, 6, 7. District of Columbia, 16. Florida, 12, 13, 14. Georgia, 8, 10, 11, 12, 15, 25. Illinois, 2, 3, 21, 22, 24, 25, 26, 27. Indiana, 2, 3, 4, 5, 8, 16, 18, 22, 25. Indian Territory, 2, 4. Iowa, 18, 21, 22, 24, 25, 27. Kansas, 2, 3, 10, 21, 22, 25. Kentucky, 4, 5, 6, 9, 11, 15, 16, 17, 18, 19, 23, 24, 25, 26. Louisiana, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 25, 28. Maine, 22, 26, 27. Maryland, 3, 5, 6, 7, 8, 9, 15, 16, 17, 26. Massachusetts, 3, 4, 13, 16 17, 18, 19, 25, 26, 28. Michigan, 3, 20, 22, 25, 26, 28. Minnesota, 21, 25, 26. Mississippi, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 24, 25. Missouri, 2, 3, 4, 23, 24, 25, 26. Montana, 16, 22. Nebraska, 1, 2, 21, 22, 25, 26. Nevada, 2, 8. New Hampshire, 17, 18, 26, 27. New Jersey, 3, 7, 8, 12, 13, 26. New York, 3, 4, 16, 25, 26, 27. North Carolina, 3, 11, 12, 13, 16, 22. North Dakota, 15. Ohio, 3, 4, 15, 16, 18, 19, 22, 23, 25, 28. Oklahoma, 2, 3, 12, 25. Oregon, 1, 2, 5, 7, 12, 20, 21, 23, 24, 25, 26, 27, 28. Pennsylvania, 2, 3, 4, 8, 16, 17, 26. South Carolina, 11, 12. South Dakota, 20. Tennessee, 2, 3, 4, 5, 6, 7, 15, 16, 18, 22, 23, 26. Texas, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 24. Utah, 2, 3, 15, 17. Vermont, 3, 7, 26. Virginia, 3, 4, 5, 6, 7, 8, 9, 12, 15, 16. Washington, 7, 8, 9, 12, 25. West Virginia, 3, 5, 16. Wisconsin, 25, 26. Wyoming, 5, 6, 7.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	22	50	n.	Idaho Falls, Idaho	27	50	sw.
Do	27	50	sw.	Independence, Cal	1	54	nw.
Atlantic City, N. J	13	50	n.	Mount Tamalpais, Cal.	14	61	nw.
Block Island, R. I	8	66	e.	Do	15	64	nw.
Do	13	71	n.	Do	21	50	n.
Buffalo, N. Y.	9	52	w.	Do	23	64	nw.
Do	19	55	w.	Do	24	73	nw.
Do	26	52	sw.	Do	25	75	nw.
Do	27	54	w.	Do	26	84	nw.
Do	28	60	sw.	Nantucket, Mass	13	52	ne.
Cape Henry, Va	1	52	nw.	New York, N. Y	9	60	nw.
Do	13	60	n.	Do	13	57	nw.
Cape May, N. J	13	50	nw.	Do	14	61	nw.
Do	14	50	nw.	Do	27	64	s.
Do	27	55	w.	Point Reyes Light, Cal	4	51	nw.
Carson City, Nev	1	58	sw.	Do	10	52	nw.
Cheyenne, Wyo	19	50	nw.	Do	14	56	nw.
Do	27	58	w.	Do	15	52	nw.
Eastport, Me	13	72	ne.	Do	23	71	nw.
Do	14	60	ne.	Do	24	75	nw.
El Paso, Tex	25	58	sw.	Do	25	70	nw.
Erie, Pa	26	52	s.	Do	26	50	nw.
Fort Canby, Wash	14	54	se.	Winnemucca, Nev	28	51	sw.
Hatteras, N. C	13	52	w.	Woods Hole, Mass	1	54	nw.
Havre, Mont	15	52	sw.	Do	8	60	nw.
Do	18	51	sw.	Do	14	72	nw.

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.9	+0.4	Missouri Valley	5.0	−0.4
Middle Atlantic	6.1	+0.5	Northern Slope	5.8	+1.0
South Atlantic	5.8	+0.5	Middle Slope	4.4	0.0
Florida Peninsula	4.8	+0.2	Southern Slope	3.9	−0.9
East Gulf	6.2	+0.7	Southern Plateau	2.2	−0.8
West Gulf	5.6	−0.2	Middle Plateau	5.2	+0.4
Ohio Valley and Tennessee	6.3	+0.1	Northern Plateau	6.5	−0.2
Lower Lake	7.0	+0.2	North Pacific Coast	8.0	+1.0
Upper Lake	5.8	−0.5	Middle Pacific Coast	4.1	−0.7
North Dakota	4.3	−0.8	South Pacific Coast	2.4	−1.7
Upper Mississippi Valley	5.3	0.0			

HUMIDITY.

The relative humidity of the air continued low in the middle and south Pacific coast districts as well as the southern Plateau region; elsewhere the changes from the normal were slight.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	76	+ 1	Missouri Valley	72	− 5
Middle Atlantic	79	+ 5	Northern Slope	77	+ 8
South Atlantic	80	+ 2	Middle Slope	72	+ 6
Florida Peninsula	83	+ 1	Southern Slope	65	− 5
East Gulf	81	+ 3	Southern Plateau	36	−12
West Gulf	76	+ 3	Middle Plateau	64	+ 2
Ohio Valley and Tennessee	77	+ 3	Northern Plateau	75	− 3
Lower Lake	75	− 5	North Pacific Coast	85	0
Upper Lake	83	+ 2	Middle Pacific Coast	65	−11
North Dakota	77	− 4	South Pacific Coast	61	−10
Upper Mississippi Valley	76	− 1			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms

are given in Table VII, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 708 thunderstorms were received during the current month as against 492 in 1898 and 426 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 3d, 190; 25th, 108; 26th, 102.

Reports were most numerous from: Tennessee, 78; North Carolina, 68; Florida, 63; Missouri, 46.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, 20th to 28th.

The greatest number of reports were received for the following dates: 11th, 85; 12th, 32; 13th, 8.

Reports were most numerous from: North Dakota, 23; Minnesota, 21; Iowa, 16; South Dakota, 15; Michigan, 14.

In Canada.—Auroras were reported as follows: Charlottetown, 11th; Quebec, 11th, 12th, 27th; Montreal, 14th; Ottawa, White River, Swift Current, and Banff, 12th; Kingston, 11th, 23d; Port Arthur, 12th, 13th; Minnedosa, 9th, 10th, 12th; Medicine Hat, 16th; Prince Albert, 28th; Battleford, 3d, 10th, 11th.

No thunderstorms were reported.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 40.0°, or 7.1° below normal; the highest was 80°, at Healing Springs on the 4th and at Alco on the 22d, and the lowest, 17° below zero, at Valleyhead on the 12th. The average precipitation was 6.61, or 0.66 above normal; the greatest monthly amount, 9.39, occurred at Clanton, and the least, 1.67, at Daphne. The month was the coldest on record. Several persons were frozen to death; stock suffered very much; in some counties cows, hogs, and goats froze to death, and poultry froze on the roost; large numbers of game birds perished, and swift-running streams, never before known to freeze, were covered with ice; the ice on ponds in middle counties was thick enough for skating on the 13th and 14th, while at Montgomery sleighing was indulged in for three days.—*F. P. Chaffee.*

Arizona.—The mean temperature was 46.8°, or 1.0° below normal; the highest was 90°, at Parker on the 21st and 22d, and the lowest, 24° below zero, at Fort Defiance on the 7th. The average precipitation was 0.45, or 0.57 below normal; the greatest monthly amount, 2.58, occurred at Flagstaff, while none fell at a number of stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 31.8°, or 11.9° below normal, and was the coldest February on record; the highest was 75°, at Conway on the 28th, and the lowest, 25° below zero, at Corning and Winslow on the 12th and at Keesees Ferry on the 13th. The average precipitation was 2.18, or 1.72 below normal; the greatest monthly amount, 4.15, occurred at Brinkley, and the least, 0.63, at Texarkana.—*E. B. Richards.*

California.—The mean temperature for the State, obtained by weighting the reports from 280 stations, so that equal areas have about equal weight, was 48.5°, or 0.1° below normal; the highest recorded was 100°, at Tres Pinos, San Benito County, on the 19th, and the lowest, 30° below zero, at Boca, Nevada County, on the 6th. The average precipitation for the State, as determined by the records of 299 stations, was 0.45; the deficiency, as indicated by reports from 168 stations which have normals, was 2.88; the greatest monthly precipitation was 10.95, at Crescent City, Del Norte County, while none fell at many stations.—*W. H. Hammon.*

Colorado.—The mean temperature was 18.2°, or 8.8° below normal; the highest was 68°, at Minneapolis on the 27th, and the lowest, 45° below zero, at Greeley on the 12th. The average precipitation was 0.98, or normal; the greatest monthly amount, 5.08, occurred at Breckenridge, and the least, 0.06, at Garnett.—*F. H. Brandenburg.*

Georgia.—The mean temperature was 43.6°, or 4.2° below normal; the highest was 82°, at Mauzy on the 22d, and the lowest, 12° below zero, at Diamond and Tallapoosa on the 13th. The average precipitation was 7.47, or 2.40 above normal; the greatest monthly amount, 10.32, occurred at Diamond, and the least, 1.90, at Gundee. On the 12th and 13th the State was under the influence of the most intensely cold weather ever experienced in this section, so far as available records show. The extreme cold did immense damage to crops and caused untold suffering. Traffic was seriously interrupted and many cattle perished. Reports from several hundred correspondents show that the peach crop was totally killed in many sections, and more or less damaged in all sections of the State. Many orchards of young trees were killed outright and will have to be replanted. The oat crop was almost entirely killed in many counties, but wheat fared better, and in many sections is still very promising. The mantle of snow which covered the fields was a great protection to this crop, and it is only where the snow was blown off that any material damage was done. The damage to the fruit interests of the State means the loss of several millions of dollars to the fruit growers. It is thought apples are badly injured. Peaches on high ground suffered least. Orchards in the northern section of the State were not so far advanced and, consequently, suffered less than in the central and southern counties.—*J. B. Marbury.*

Illinois.—The mean temperature was 19.6°, or 8.3° below normal; the highest was 69°, at Plumhill on the 20th, and the lowest, 29° below zero, at Morrisonville on the 12th. The average precipitation was 2.08, or 0.21 below normal.—*C. E. Linney.*

Indiana.—The mean temperature was 21.9°, or 8.7° below normal; the highest was 67°, at Bedford on the 26th, and the lowest, 29° below zero, at Cambridge City on the 13th. The average precipitation was 2.25, or 0.48 below normal; the greatest monthly amount, 4.20, occurred at Vevay, and the least, 0.50, at Valparaiso.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 12.2°, or about 9.0° below normal; the highest was 75°, at Mount Pleasant on the 20th, and the lowest, 40° below zero, at Sibley on the 9th. The average precipitation was 0.89, or 0.17 below normal; the greatest monthly amount, 4.32, occurred at Ridgeway, and the least, 0.12, at Toledo.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

Kentucky.—The mean temperature was 26.2°, or 9.6° below normal; the highest was 71°, at Paducah and Russellville on the 20th, and the lowest, 33° below zero, at Sandyhook on the 11th. The average precipitation was 3.96, or 0.34 above normal; the greatest monthly amount, 8.34, occurred at Williamsburg, and the least, 1.84, at Louisville. The extremely cold weather during the early part of the month caused much damage to fruit.—*H. B. Hersey.*

Louisiana.—The mean temperature was 44.3°, or 9.2° below normal; the highest was 85°, at Oakridge on the 3d, and the lowest, 16° below zero, at Minden on the 13th. The average precipitation was 3.42, or 1.47 below normal; the greatest monthly amount, 6.55, occurred at Lawrence, and the least, 1.47, at the Northern Louisiana Experiment Station, Calhoun. During the cold wave of the 12th and 13th all previous records of cold weather in Louisiana were broken. On the morning of the 17th large blocks of ice appeared in the Mississippi River at New Orleans, passing in a steady stream southward at the rate of about five miles per hour, and reached the Gulf on the 19th. It is impossible to estimate the direct loss resulting from the freeze, but it is thought that it exceeds several million dollars, while the direct loss is even greater.—*A. G. McAdie.*

Maryland and Delaware.—The mean temperature was 26.6°, or 6.6° below normal; the highest was 67°, at Cumberland, and Frostburg, Md., on the 21st, and the lowest, 26° below zero, at Sunnyside, Md., on the 10th. The average precipitation was 5.51, or 1.37 above normal; the greatest monthly amount, 8.85, occurred at Coleman, Md., and the least, 2.07, at Boettcherville, Md.—*F. J. Walz.*

Michigan.—The mean temperature was 14.1°, or 6.9° below normal; the highest was 62°, at Clinton and Grape on the 26th, and the lowest, 49° below zero, at Humboldt on the 7th. The average precipitation was 1.44, or 0.43 below normal; the greatest monthly amount, 3.18, occurred at Olivet, and the least, 0.39, at Traverse City. The month was remarkable for excessive cold, it being the coldest on record. Lake Michigan was almost frozen over on the 15th. Much fruit was destroyed and considerable game, especially quail, partridge and ducks, perished on account of the extreme cold.—*C. F. Schneider.*

Minnesota.—The mean temperature was 4.5°, or about 8.0° below nor-

mal; the highest was 55°, at Pleasant Mounds, Tower, and Luverne on the 19th, and at Winnebago City on the 20th, and the lowest, 59° below zero, at Leach Lake Dam on the 9th. The average precipitation was 0.78, or about normal; the greatest monthly amount, 1.80, occurred at Rolling Green and Tower, and the least, 0.05, at Crookston.—*T. S. Outram.*

Mississippi.—The mean temperature was 36.3°, or about 10.0° below normal; the highest was 80°, at Leakesville on the 2d, and the lowest, 16° below zero, at French Camp on the 13th. The average precipitation was 4.15, or 1.35 below normal; the greatest monthly amount, 8.99, occurred at Agricultural College, and the least, 1.60, at Burke. The cold weather of the 11th, 12th, and 13th caused great damage to fruit and fruit trees; orange, fig, and persimmon trees, except possibly the Satsuma oranges, were killed to the ground. Oats were killed to the ground but are coming up again.—*W. T. Blythe.*

Missouri.—The mean temperature was 20.4°, or 11.9° below normal; the highest was 72°, at Zeitonia on the 19th and at Marblehill on the 20th, and the lowest, 32° below zero, at Birchtree and Zeitonia on the 13th. The month was the coldest February on record, and during the first two weeks of the month the temperature averaged about 25° below normal. The average precipitation was 2.17, or about normal; the greatest monthly amount, 6.84, occurred at New Madrid, and the least, 0.71, at Unionville. As a result of the extremely low temperatures of the first half of the month peach buds were very nearly all killed and a large per cent of the trees badly frozen, many being killed to the snow line. Pears, plums, and apricots also suffered severely, a large portion of the buds being killed and, in some instances, the wood badly damaged. The hardier varieties of cherries generally escaped, but sweet cherries were killed to a considerable extent. Apples were reported badly damaged in some localities but it is believed that, as a rule, they were not seriously injured. The hardy varieties of grapes are generally safe. In most of the east-central, southeastern and south-central counties winter wheat was well protected by snow during the severe cold weather and was not seriously injured, except in localities where some of the late sown was killed, but generally throughout the northern and western sections the ground was nearly or quite bare and much of the crop was greatly damaged. Clover was also badly killed in some sections, especially where closely pastured, but in many counties was reported in good condition at the close of the month.—*A. E. Hackett.*

Montana.—The mean temperature was 10.6°, or 11.4° below normal; the highest was 60°, at Utica on the 13th, and the lowest, 61° below zero, at Fort Logan on the 11th. The average precipitation was 0.87, or 0.29 above normal; the greatest monthly amount, 3.85, occurred at Darby, and the least, trace, at Billings.—*E. J. Glass.*

Nebraska.—The mean temperature was 12.1°, or 12.2° below normal, and the coldest February on record; the highest was 74°, at Tecumseh on the 20th, and the lowest, 47° below zero, at Camp Clarke on the 12th. The average precipitation was 0.61, or 0.06 below normal; the greatest monthly amount, 1.60, occurred at Superior, and the least, trace, at Haigler and Loup.—*G. A. Loveland.*

Nevada.—The mean temperature was 33.3°, or 1.1° above normal; the highest was 73°, at Candelaria on the 19th, and the lowest, 27° below zero, at Wells on the 5th. The average precipitation was 0.55, or 0.45 below normal; the greatest monthly amount, 2.47, occurred at Clover Valley, while none fell at Las Vegas.—*J. H. Smith.*

New England.—The mean temperature was 21.1°, or 2.0° below normal; the highest was 60°, at Somerset, Mass., on the 21st, and the lowest, 30° below zero, at Flagstaff, Me., on the 9th, and at Woodstock, Vt., on the 12th. The average precipitation was 3.74, or 0.30 above normal; the greatest monthly amount, 6.91, occurred at New London, Conn., and the least, 1.24, at Burlington, Vt. The month was rough and stormy; the precipitation of the first half was all in the form of snow, and of the second half rain.—*J. W. Smith.*

New Jersey.—The mean temperature was 25.8°, or 5.3° below normal; the highest was 60°, at Bridgeton and Paterson on the 22d, and the lowest, 17° below zero, at Deckertown on the 10th and at Rivervale on the 15th. The average precipitation was 6.06, or 2.00 above normal; the greatest monthly amount, 8.77, occurred at Staffordville, and the least, 3.78, at Atlantic City. The cold wave of February 9–11 will go on record as the most severe during this century, certainly during the present generation; the records covering a period of fifty years show nothing to compare with it. In some portions of the State the mean temperature for the 11th was from 1.5° to 6° below zero. The minimum was below zero at all stations on the 10th and 11th, and ranged from 3° below in the extreme southern, to 17° below in the northern portions of the State. The extreme cold was followed by one of the most severe snowstorms on record. Snow began to fall on the evening of the 11th, and continued until early in the morning of the 14th. During this period it fell to the depth of from 30 inches in the southern to 44 inches in the northern portions. All railroad travel was suspended by the 13th, and country roads were impassable for several days, the drifts being from 3 to 8 feet high in many places.

An extract from a letter received from Mr. Thomas J. Beans, Voluntary Observer, Moorestown, N. J., will prove of interest:

"I was nine years old when the snow of 1836 fell. From that time throughout my residence in Pennsylvania it was always spoken of as 'the big snow.' Enquiring of many of the old people in New Jersey, they say it was called here, 'the great snow.' At my father's home I remember the sheep were covered out of sight, and after a long search were found by holes in the snow made by their breath. The young timber was bent over in the woods so that many trees kept their bent form after they had attained size years after. A rain and freeze covered the snow with ice, so that skating over its surface was the usual way for going to school. My father hauled his hay to Philadelphia, 18 miles, on a hay body with sled runners. This corresponds with what I have gathered from old people in Jersey."—*E. W. McGann.*

New Mexico.—The mean temperature was 33.3°, or 2.7° below normal; the highest was 79°, at Eddy on the 21st and 22d and at Rincon on the 24th, and the lowest, 27° below zero, at Winsors on the 7th. The average precipitation was 0.42, or 0.25 below normal; the greatest monthly amount, 2.20, occurred at Winsors, while at Aztec and Socorro there was no precipitation, and only a trace at Bernallio, Deming, Hillsboro, and Los Lunas.—*R. M. Hardinge.*

New York.—The mean temperature was 20.5°, or 3.5° below normal; the highest was 58°, at Elmira on the 20th, and the lowest, 31° below zero, at Number Four on the 11th. The average precipitation was 2.47, or 0.19 below normal; the greatest monthly amount, 6.20, occurred at Kings Station, and the least, 0.65, at Mount Morris.—*R. G. Allen.*

North Carolina.—The mean temperature was 36.5°, or 6.8° below normal; the highest was 77°, at Fayetteville on the 4th, and the lowest, 19° below zero, at Highlands on the 13th. The average precipitation was 7.95, or 3.61 above normal; the greatest monthly amount, 13.28, occurred at Highlands, and the least, 3.94, at Wilmington. Farm work was entirely suspended throughout the month The damage by the freeze to the truck crops in the east is not thought to have been very great.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 3.0°, or 4.7° below normal; the highest was 60°, at Berthold Agency on the 16th, and the lowest, 48° below zero, at McKinney on the 8th. The average precipitation was 0.23, or 0.26 below normal; the greatest monthly amount, 0.52, occurred at Medora, and the least, trace, at Jamestown, Larimore, Melville, and Steele.—*B. H. Bronson.*

Ohio.—The mean temperature was 21.6°, or 6.8° below normal; the highest was 67°, at Hanging Rock on the 20th, and the lowest, 39° below zero, at Milligan on the 10th. The lowest temperature ever recorded was experienced in many towns, and water pipes were badly frozen in all sections of the State. The average precipitation was 2.11, or 0.76 below normal; the greatest monthly amount, 4.52, occurred at Wauseon, and the least, 0.89, at Killbuck.—*J. Warren Smith.*

Oregon.—The mean temperature was 34.8°, or 1.8° below normal; the highest was 74°, at Winona on the 19th, and the lowest, 27° below zero, at Silverlake on the 4th. The average precipitation was 5.91, or 1.24 above normal; the greatest monthly amount, 22.22, occurred at Government Camp, and the least, 0.01, at P. Ranch.—*B. S. Pague.*

Pennsylvania.—The mean temperature was 22.7°, or 5.9° below normal; the highest was 67°, at Huntingdon on the 21st, and the lowest, 39° below zero, at Lawrenceville on the 11th. The average precipitation was 4.05, or 1.10 above normal; the greatest monthly amount, 10.22, occurred at Coatesville, and the least, 0.98, at Shinglehouse. On the 11th all previous records of low temperatures were broken in nearly all sections of the State, and during the latter part of the day a severe snowstorm, accompanied by high winds, set in, and by the morning of the 12th railroads and trolleys were so badly blocked that transportation of all kinds was almost suspended. The storm continued with unabated energy throughout the 12th and 13th, during which time traffic was at a standstill. The snow was piled up in high drifts and cities and towns were completely cut off from outside communication, except by wire, and the streets were almost impassable to pedestrians. There being no heavy lodgment of ice or snow on the telegraph lines, telegraph and telephone service was but little interrupted. Many employees were unable to reach their places of business in the cities, and in the coal regions mines were shut down because the miners were snowbound in their homes.—*T. F. Townsend.*

South Carolina.—The mean temperature was 43.0°, or 7.0° below normal; the highest was 80°, at St. Matthews on the 4th, and at Summerville on the 5th, and the lowest, 11° below zero, at Santuc and Shaws Forks on the 14th. The average precipitation was 6.98, or 3.32 above normal; the greatest monthly amount, 12.30, occurred at Trenton, and the least, 3.23, at Allendale. The cold wave of the 11-14th exceeded in severity, and gave lower temperatures than any before known in South Carolina, with authenticated records. Tradition, indeed, marks the month of February, 1835, as equally cold, but persistent research and inquiry has failed to bring to light any thermometer readings for that month, unless an article in a daily newspaper correspondence from Summerville, S. C., in which the writer stated that he heard that in 1835 the thermometer fell to 2° above, and from another source that it fell to zero, can be substantiated. Over the western portions of the State the cold period of February 6 and 7, 1835, held the first place in cold weather traditions, but no thermometer readings whatever have been discovered covering those dates.—*J. W. Bauer.*

South Dakota.—The mean temperature was 7.0°, or about 9.0° below normal; the highest was 65°, at Yankton on the 19th, and the lowest, 47° below zero, at Ladelle on the 9th. The average precipitation was

0.36, or 0.56 below normal; the greatest monthly amount, 1.11, occurred at Flandreau, and the least, trace, at Alexandria, Mellette, and Watertown.—*S. W. Glenn.*

Tennessee.—The mean temperature was 30.2°, or about 10.0° below normal; the highest was 76°, at Madison on the 20th, and the lowest, 30° below zero, at Erasmus on the 13th. The average precipitation was 5.83, or about 0.75 above normal; the greatest monthly amount, 14.15, occurred at Oakhill, and the least, 2.70, at Union City.—*H. C. Bate.*

Texas.—The mean temperature was 11.1° below normal; there was a general deficiency, ranging from 8° to 15°, with the greatest in the interior; the highest was 99°, at Fort Ringgold on the 3d, and the lowest, 23° below zero, at Tulia on the 12th. The average precipitation, determined by comparison of 50 stations, distributed throughout the State, was 1.10 below the normal. There was only a slight deficiency over the east coast district and the extreme western portion of west Texas, while the deficit was general in other sections and amounted to more than 1 inch in most places, with the greatest, 2.61, at Longview. The greatest monthly amount, 3.58, occurred at Brazoria, while none fell at several stations in the western portion. The month was very unfavorable for farming operations. The severe cold spell at the opening of the second decade stopped farm work in all sections. Drought is becoming very severe in places over west and north portions, placing farmers considerably behind with their work, especially plowing and making preparations for spring crops.—*I. M. Cline.*

Utah.—The mean temperature was 28.8°; the highest was 77°, at St. George on the 19th, and the lowest, 50° below zero, at Woodruff on the 6th. The average precipitation was 1.73; the greatest monthly amount, 5.85, occurred at Heber, and the least, trace, at Giles and St. George.—*L. H. Murdoch.*

Virginia.—The mean temperature was 30.2°, or 8.1° below normal; the highest was 80°, at Westpoint on the 4th, and the lowest, 29° below zero, at Monterey on the 10th. The average precipitation was 5.50, or 1.99 above normal; the greatest monthly amount, 8.18, occurred at Hampton, and the least, 2.65, at Monterey. The heavy fall of snow which attended the cold period of 10–16th afforded protection to winter crops and no winter killing has been reported.—*E. A. Evans.*

Washington.—The mean temperature was 32.5°, or 4.0° below normal; the highest was 63°, at Centerville on the 14th, at Kennewick on the 17th and at Fort Simcoe on the 18th, and the lowest, 36° below zero, at Usk on the 4th. The average precipitation was 5.43, or 1.30 above normal; the greatest monthly amount, 20.98, occurred at Clearwater, and the least, 0.31, at Sunnyside.—*G. N. Salisbury.*

Wisconsin.—The mean temperature was 9.3°, or 7.5 below normal; the highest was 58°, at Butternut on the 21st, and the lowest, 50° below zero, at Easton on the 10th. The average precipitation was 0.95, or 0.09 above normal; the greatest monthly amount, 2.51, occurred at Dodgeville, and the least, trace, at Racine and Westbend.—*W. M. Wilson.*

Wyoming.—The mean temperature was 11.2°, or 11.2 below normal; the highest was 55°, at several stations on different dates, and the lowest was 51° below zero, at Lowell on the 4th and at Basin on the 5th. The average precipitation was 1.78, or 1.03 above normal; the greatest monthly amount, 5.90, occurred at Centennial, and the least, 0.13, at Alcova. As a whole, the month was one of the coldest and stormiest on record in Wyoming.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

SNOW TEMPERATURES.

By E. B. CALVERT and W. F. R. PHILLIPS.

The snowstorms of February 5–8 and 11–13, 1899, were, for both the depth of the snowfall and the subsequent cold weather, most unusual for the region in which Washington, D. C., is situated. Following these storms the writers made some thermometric observations of the temperature of the snow at different depths from the surface. From the practical value that such observations appear to possess, we think that the series made by us is suggestive and of sufficient importance to publish.

The observations were made in snow that fell on an open plat of sod covered ground on the north side of the Weather Bureau building. Two classes of observations were made. One in snow on which the sun had shone for some hours and the other in snow that had been shaded for some time by the building.

Snow began to fall on the morning of February 5 and continued at intervals till the morning of the 8th. At the end of the storm the snow was about 13 inches deep. At the beginning of the snow the temperature of the air was 32°, and it gradually fell to 25° at the end of the storm. The temperature continued to fall till on the morning of the 11th it was 15° below zero, the lowest temperature ever recorded for Washington, D. C. The second storm began during the afternoon of the 11th and continued into the night of the 13th. The temperature of the air during this storm ranged from 15° below zero to 11° above. The snow was considerably drifted by the high winds that prevailed during its fall. On the morning of the 14th the snow measured from 25 to 30 inches deep in level places in front of the Weather Bureau building.

The first set of snow temperature observations was made on the afternoon of February 9 in snow 10 inches deep. At this time the atmospheric temperature was 8°. A thermometer lying immediately on the surface of the snow indicated, in the shade, a temperature of 3°, and, in the sun, a temperature of 9°. The results of the other readings made in the shade were as follows, viz: Three inches below the surface of the snow (or 7 inches from the surface of the ground) the temperature was 16°; 6 inches below the surface (4 inches from the ground) it was 20°; and 10 inches below the surface, the bulb of the thermometer touching the ground, the temperature was 31°.

On the following morning, with an air temperature of 6°

February, 1899.

Distance of thermometer bulb from surface of—		9th.		10th.				11th.				14th.			
		3 p. m.		10 a. m.		3 p. m.		10 a. m.		3 p. m.		10 a. m.		3 p. m.	
Snow.	Ground.	Shade.	Sun.	Shade.	Sun.	Shade.	Sun.	Shade.	Sun.	Shade.	Sun.	Shade.	Sun.	Shade.	Sun.
On surface	10 inches above	3.0	9.0	— 7.5	— 7.5	— 3.0	5.5	3.0	15.5	11.0	14.0	8.0			
Just below	9-10 inches above				— 5.5	— 4.0	3.5	1.0	14.5	9.5	15.5	8.0			
3 inches below	7 inches above	16.0	15.0	3.5	5.5	5.0	11.0	5.0	11.0	15.0	15.0	6.5			
6 inches below	4 inches above	20.0	20.0	14.0	15.0	15.0	16.5	16.0	20.0	18.5	20.0	9.5			
6 inches below	On ground		31.5		27.0		28.0								
9 inches below	1 inch above		27.0	29.0	28.0	28.0	29.0			18.5	27.0	9.5			
10 inches below	On ground	31.0	31.0	31.0	29.5	31.5	30.0	27.0	32.0	31.0	29.0				
25 inches below	On ground											30.5			31.5
19 inches below	6 inches above											25.0			24.5
16 inches below	9 inches above											21.0			23.5
13 inches below	12 inches above											18.0			18.0
7 inches below	18 inches above											12.0			11.5
On surface	25 inches above											10.0			24.0
Temp. of air 65 feet above snow		8.0		— 6.0		3.0		— 1.0		12.0		13.0		22.0	
Temp. of air 1 foot above snow		6.0		— 5.0		2.0		1.5		11.0		14.5			
Velocity of wind, in miles per hour		22.0		14.0		12.0		6.0		4.0		17.0		11.0	

to 8° below zero, a thermometer on the surface of the snow, in the shade, indicated 7.5° below zero; at the same time one 6 inches below the surface read 14° above zero; and one 10 inches below the surface and touching the ground read 31°, the same as the evening before.

On the morning of the 11th, when the average temperature of the air had been 2° below zero for the preceding twenty-four hours, a temperature of 27° was registered by a thermometer 10 inches below the surface of the snow and in contact with the ground. This was the lowest temperature observed in the layer of snow immediately touching the soil.

Observations were made also in a spot of several square yards in extent from which the snow had been blown till it measured but 6 inches in depth. The temperature of the snow in contact with the ground was found to range from 31.5° to 27°. The snow in this place was exposed to the sun throughout the day.

On the 14th, observations were made in snow 25 inches deep, the depth of the snow having been greatly increased by the storm of the 11–13th. The results were the same as had been previously found so far as regards the temperature of the snow immediately on the surface of the ground.

It was noticed in all our observations that the temperature of the snow layer immediately touching the ground was fairly uniform, being on the average 31°. During the period covered by our observations the extreme range of temperature of the snow layer in contact with the ground was but 5°, while that of the atmosphere was 37°. The greatest difference observed between the atmospheric temperature and that of the snow near the ground was 38.5°, on the morning of the 10th, the temperature of the air being 7.5° below zero, and that of the snow layer touching the ground 31° above zero.

The observations made in snow upon which the sun had shone for some hours showed that the temperature of the superficial layer of the snow was considerably influenced by direct solar radiation.

The most striking fact developed in our observations was the relatively high and uniform temperature observed at the surface of the ground. This was due undoubtedly to the barrier to radiation interposed by the snow mantle. From the 5th to 14th, inclusive, the average temperature of the air was 13°, and the average temperature of the snow covered soil was certainly not below 31°. In other words, notwithstanding the fact that the temperature of the air was for 240 hours 18° lower than that of the soil, yet the latter apparently lost none of its heat. That the surface soil actually lost heat there can be no doubt, but the loss was gradual and no more rapid than the rate of conduction upward from the warmer underlying layers of earth.

The practical benefits resulting from these two snow storms, storms in which few perhaps saw any good, may now be mentioned. Had the severe cold that came with and stayed after the snows occurred without snow, or without a snow covered ground, the temperature of the soil would have fallen many degrees below freezing, and the damage to vegetation resulting from the freezing of the roots would have been enormous. But wherever the ground was covered by snow no such damage was done.

The observations are shown in detail in the table.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made nearly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological observations at Honolulu.

FEBRUARY, 1899.

The station is at 21° 18′ N., 157° 50′ W.; altitude 50 feet.
Pressure is corrected for temperature and reduced to sea level, and the gravity correction, −0.06, has been applied.
The average direction and maximum force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, connected by a dash, indicate change from one to the other.
The rainfall for twenty-four hours is now given as measured at 1 p. m. Greenwich time on the respective dates.
The rain gauge, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2:30 a. m., Honolulu time, of the respective dates.									
				Temperature.		Means.		Wind.		Total rainfall.	Average cloudiness.	Sea-level pressures.	
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Maximum force.			Maximum.	Minimum.
	*	†	†			‡	‡		§				
1	29.83	64	63.5	78	62	63.3	76	nne.	3	0.00	5-2	29.99	29.88
2	29.76	63	62	78	62	64.5	82	nne-w.	1	0.00	6	29.85	29.74
3	29.82	64	62	77	62	64.5	84	sw.	1	0.02	3-6	29.85	29.76
4	29.82	66	64	78	62	63.5	81	sw-w.	1	0.00	1-3	29.88	29.78
5	29.85	69	66.5	79	63	65.5	79	sw-w.	2	0.00	2-7	29.88	29.82
6	29.92	70	69	79	68	66.3	78	sw.	3-1	0.01	5-2	29.93	29.86
7	29.91	69	67	80	69	69.0	86	sw.	3-1	2.33	8-10	29.97	29.90
8	29.94	68	67	73	68	67.5	92	sw-w.	2-0	1.07	10	29.98	29.91
9	29.99	67	66.5	78	67	68.5	87	sw.	2-0	0.00	3-8	29.99	29.92
10	30.06	64	63	78	67	67.7	90	sw-s.	1-0	0.02	2	30.05	30.00
11	30.04	63	62.5	80	63	64.0	69	s-e.	1	0.00	1	30.10	30.00
12	30.00	64	63	81	62	64.7	80	se-ne.	2-0	0.00	1-3	30.08	29.99
13	30.01	69	64	79	63	64.0	81	sw-nw.	2	0.01	3-7	30.04	29.97
14	30.00	68	64	78	63	62.7	71	ne-s.	2-0	0.00	5	30.07	29.98
15	30.03	67	65	80	67	64.0	74	sw.	1	0.00	5	30.07	30.01
16	30.01	69	67.5	80	64	66.0	81	s.	1	0.08	5	30.09	30.00
17	30.01	65	64	80	65	67.5	84	ne-sw.	1-0	0.00	6-1	30.06	29.97
18	30.00	72	64	79	64	63.5	76	s-ne.	1	0.00	5	30.04	29.96
19	29.97	72	67	78	71	60.7	64	ne.	3	0.05	6	30.03	29.96
20	29.99	72	65	79	70	63.0	68	ne.	3-0	0.00	4	30.04	29.96
21	29.99	72	65.5	80	66	62.0	66	ne.	2	0.01	3-6	30.03	29.96
22	29.97	71	64.5	78	71	61.7	67	ne.	3-4	0.03	4	30.03	29.95
23	29.94	71	65	77	69	62.0	68	ne.	3-4	0.08	2-6	30.00	29.90
24	29.95	71	66	76	69	63.3	73	ne.	4	0.04	5-3	29.99	29.91
25	30.01	72	67	80	68	64.0	70	ne.	3-0	0.09	7	30.01	29.96
26	30.07	72	66	79	68	64.5	70	ne.	3-5	0.01	5	30.09	30.01
27	30.05	69	66	78	71	61.5	64	ne.	4-6	0.15	8	30.10	30.01
28	30.05	71	65	77	68	63.3	76	ne.	5-6	0.03	9-6	30.10	30.01
Sums.	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.01	.....	.....	.....
Means.	29.961	68.4	65.0	77.0	66.1	64.4	76.3	.....	‖	....	¶	30.012	29.931
Departure.	−0.01	.....	.....	.....	.....	+2.2	+0.3	.....	.....	−1.00	.....	.....	.....

Mean temperature for February, 1899 (6+2+9)÷3=71.9°; normal is 70.3°. Mean pressure for February is 29.96; normal is 29.97.
* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4:30 p. m., Greenwich time. ‡ These values are the means of (6+9+2+9)÷4. § Beaufort scale. ‖ Mean for the daytime is 1.0. ¶ The mean during daylight is 4.4.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined list of titles has been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Annales Agronomiques, Paris, Tome 25.

Pagnoul. Influence des pluies et de la nature des terres sur le rendement des fourages. P. 83.

Scottish Geographical Magazine, Edinburgh, Vol. 15.

Taylor, W. A. Meteorology of Mount Etna. [Abstract from Ciel et Terre.] P. 147.

Nature, London, Vol. 59.

Arcimis, A. Probable Weather Conditions in Spain, during the Total Solar Eclipse of May 28, 1900. P. 439.

MacDowall, A B. American and English Winters. P. 416.

Bulletin of the American Geographical Society, Vol. 31.
Whymper, E. A New Mountain Aneroid Barometer. P. 75.
La Nature, Paris, 27me. Année.
Plumandon, J. R. Les extrêmes de température dans le monde. P. 226.
Das Wetter, Berlin, Jan. 1899.
Arendt, Theodor. Ueber die Zunahme der Blitzgefahr. [Concluded.] p. 32.
Annalen der Physik und Chemie. Leipzig. Band 67.
Mannesmann, O. Luftwiderstandsmessungen mit einen neuen Rotationsapparat. P. 105.
Comptes Rendus, Paris, Tome 128.
Deherain, P. P. Le travail du sol. P. 474.
Pallodine, W. Influence de la lumière sur la formation des substances azotes vivantes dans les tissues des végétaux. P. 377.
Philosophical Magazine, London, Vol. 147.
Raleigh, *Lord.*—Cooling of Air by Radiation and Conduction, and the Propagation of Sound. P. 308.
Ciel et Terre, Bruxelles, 19me. année.
Spring, W. Sur l'origine de la couleur bleue du ciel. P. 587.
Roquiny-Adanson, G. de. Les orages en janvier dans le centre de la France. P. 599.
Ciel et Terre, Bruxelles, 20me année.
St. Hepites. Climatologie du littoral roumain de la mer Noire. P. 1.
——Consommation d'eau par les arbres. [From Die Natur.] P. 23.
Meteorologische Zeitschrift, Wien, Band 16.
Bornstein, R. Böenstudien gelegentlich des Gewitters vom 22 Juni 1898. P. 1.
Kohlbrugge, J. H. F. Meteorologische Beobachtungen zu Tosari. (Java.) P. 5.
Laska, W. Ueber die Form der Hagelwolken. P. 22.
Hann, J. Klima von Lima. P. 32.
Zeitschrift für Luftschiffhart. Berlin. 17 *Jahrg.*
Platte, A. Zur Theorie der Luftschiffahrt mit theilweiser Entlastung. P. 245.
Berson, A. In den Fusstappen Glascher. P. 255.
Annuaire de la Société Météorologique de France, 46 *année.*
Lobat. Température de la mer. P. 72.
Scottish Geographical Magazine. Edinburg. Vol. 15.
Taylor, W. A. Egyptian Sudan. [Climate, etc.] P. 57.
Symons Meteorological Magazine. London. Vol. 34.
Symons, G. J. Frost and anticyclones. P. 6.
Dansey, R. P. Temperature reversal [case of]. P. 8.
Journal of the Franklin Institute. Philadelphia. Vol. 147.
Griffith, C. E. Anthracite Coal in Peru. [Contains account of Climate of Peru.] P. 227.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletin Mensual;* an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for February, 1899.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Colima	1,656	28.30	86.9	49.3	70.0	58	.....	wsw.	sw.
Durango (Seminario)	6,243	24.39	80.6	26.6	54.9	34	.....	sw.	e.
Jalapa (1)	4,593	25.56	78.8	46.4	58.3	86	8.09	nw.	.....
Leon (Guanajuato)	5,934	24.28	74.4	30.4	57.6	34	.....	sw.	sw.
Magdalena (Sonora)	2,618	.....	.....	....	58.5	.....	0.91	s.	n.
Mexico (Obs. Cent.)	7,472	23.04	74.7	40.1	56.8	48	0.13	ne.	nw., sw.
Morelia (Seminario)	6,401	23.96	77.9	40.5	59.9	55	.....	sw.	sw.
Oaxaca	5,164	25.06	87.4	35.2	66.7	55	.....	se.	sw.
Puebla (Col. Cat.)	7,112	23.34	74.3	34.0	59.2	62	.. ...	sse.	.....
San Isidro	.....	.....	82.4	51.8	.....	.....	....	w.	.....
Tuxpan (Vera Cruz)	19	30.00	98.2	29.8	67.3	79	2.66	nw., ne.	n.
Zapotlan (Seminario)	5,078	25.16	80.1	40.5	63.5	65	.....	sse.	wsw.

(1) The altitude of Jalapa differs from that formerly given, i. e., 4,757 feet, by 50 meters.

WAVE OR BILLOW CLOUDS.

ALFRED J. HENRY, Chief of Division.

A remarkably perfect type of wave or billow clouds, parallel bands or ridges, separated by a small space of clear sky, as a furrow separates the rows of grain in a field, was seen at Washington, D. C., at 8 a. m. November 23, 1898.

Plates I, II, III and IV have been reproduced from photographs made by the writer at 8:25, 8:30, 9:35 and 9:40 a. m., seventy-fifth meridian time, respectively. Plate I is a transverse view of the clouds as they approached from the southwest. The photograph from which the illustration was reproduced was made on the roof of the Weather Bureau building in Washington, D. C.

Plate II is a longitudinal view of the same clouds made in the same position but looking eastward, the camera being turned through an angle of about 90°.

Plates III and IV are views made about an hour later, viz, at 9:35 and 9:40 a. m. The position of the camera in the last-named views was not quite the same as those made earlier in the day, as may be seen by the horizon line.

The clouds were probably in the alto-cumulus level, possibly a little lower, and their apparent motion was rather rapid. The direction of the parallel bands, when first observed, was approximately east and west. Later it seemed to change slightly, taking a direction, say from north 80° west to south 80° east. The degradation of the clouds began about 9 o'clock; an hour later the last vestige had disappeared, although the sky was almost half covered with cirrus and cirro-stratus. The last named appear in Plate III and less distinctly in Plate IV.

In the lower left-hand corner of Plate II small, detached clouds may be seen. While looking at this portion of the sky at 9 a. m., a remarkably distinct file of five or six small clouds was observed in the rear of a larger cloud mass. In a moment a small cloud became visible directly in the rear of the file above referred to. It seemed to remain motionless for a few seconds, increasing in size meanwhile, and finally moving forward in the line of march, and this process was repeated until there were 12 small clouds moving forward in column formation where there had been but 5 or 6 originally. The clouds now began to decrease in size, and the formation of new clouds ceased.

The general weather conditions at the surface of the ground, as shown by the morning weather map of the 23d were as follows: An area of high pressure with cold, northwesterly winds was approaching from the west. Pressure was relatively low off the Carolina coast, 29.94 at Hatteras. It was snowing in western Pennsylvania and raining in the eastern part of the state as also in New Jersey. The rain had ceased at Washington, the wind having shifted from southeast to northwest at 9:30 p. m. of the 22d; the temperature at that hour was about 53°; it began to fall soon thereafter and continued falling during the night, reaching a minimum of 34°, from which point it had risen to 36° at the time the first photograph was made. The wind was blowing steadily from the northwest at a velocity of 12 miles per hour. Pressure was 30.10 inches, having risen 0.18 inch during the last twenty-four hours.

Plates V and VI show a somewhat similar cloud formation on January 27, 1899.

The clouds were moving toward the northeast, as in the case first mentioned. The weather conditions were also similar in many respects. An area of high pressure and lower temperature was approaching from the west. The storm, central the preceding morning in upper Michigan, had moved rapidly to the Gulf of St. Lawrence, accompanied by violent westerly gales on the lower Lakes. High northerly winds

prevailed over the region about Washington, while the cloud motion would seem to indicate a rapid movement of the upper currents toward the center of the depression over the Gulf of St. Lawrence.

The formation of billow clouds has been explained by various persons: Professor Cleveland Abbe, in this country; the Reverend Clement Ley, in England; Professor H. von Helmholtz, and Dr. von Bezold, in Germany, and doubtless others.

So far as observed, wave clouds have no particular significance, in this country at least, although Dr. Kassner, of Berlin, is of opinion that in many cases they are an indication of precipitation. (Meteorologische Zeitschrift, 1894, p. 434.)

NOTES BY THE EDITOR.

THE WEIGHT OR MASS OF THE ATMOSPHERE.

A correspondent has recently asked for "the computed weights of the earth and of the atmosphere." The weight of any mass as ordinarily determined is frequently confounded with the mass itself, whereas it is strictly speaking a special property of the mass. We use a standard piece of metal called a "pound weight" and balance that against any other object, and say that the latter weighs a pound; we mean that the latter has the same mass as that of the pound weight. In doing this we assume that the same force of gravity acts upon the object and the standard weight, and that too in exact proportion to their masses. If, on the other hand, the force of gravity acts with less intensity on the object than on the standard weight then the fact that they counterbalance each other would tell us nothing about the relative masses.

As the reply to our correspondent may be helpful to others, and illustrates a principle that is important in meteorology, we have revised the figures originally communicated to him and submit the following:

(1). *The computed weight of the earth.*—The weight of any mass depends upon the force of gravity and can, therefore, not be stated except for some definite locality. The standard value of gravity is usually assumed to be that which prevails on the earth's surface at 45° latitude and sea level. At this place a pound of water considered as a mass has a weight or produces a pressure of one standard pound considered as a weight or pressure. A cubic foot of water at this place will weigh about 62.5 pounds, and a cubic foot of the average earth will weigh about 343.75 pounds, because the average density of the whole earth has been determined to be about 5.5 times the density of water. The whole earth, if it were compressed into so small a space that this standard gravity could act uniformly on it, would, therefore, at this place weigh as many pounds as the product of 343.75 multiplied by the volume of the earth expressed in cubic feet. This volume, as given by Woodward's Smithsonian Tables, page LXV, is 259,880,000,000 cubic miles, and a cubic mile contains 5,280×5,280×5,280 cubic feet.

Latitude.	Mean pressure at sea level.	Cosine latitude.	Latitude.	Mean pressure at sea level.	Cosine latitude.	Latitude.	Mean pressure at sea level.	Cosine latitude.
°	*Inches.*		°	*Inches.*		°	*Inches.*	
N. 90	29.95?	0.0000	25	29.94	0.9063	35	30.02	0.8191
85	29.95?	0.0872	20	29.89	0.9397	40	29.94	0.7660
80	29.94	0.1736	15	29.85	0.9659	45	29.82	0.7071
75	29.92	0.2588	10	29.84	0.9848	50	29.65	0.6428
70	29.87	0.3420	N. 5	29.84	0.9961	55	29.46	0.5736
65	29.85	0.4226	0	29.84	1.0000	60	29.27	0.5000
60	29.87	0.5000	S. 5	29.85	0.9961	65	29.12	0.4226
55	29.91	0.5736	10	29.89	0.9848	70	29.06	0.3420
50	29.95	0.6428	15	29.93	0.9659	75	28.98?	0.2588
45	29.98	0.7071	20	29.99	0.9397	80	28.92?	0.1737
40	30.00	0.7660	25	30.05	0.9063	85	28.89?	0.0872
35	30.02	0.8192	30	30.08	0.8660	S. 90	28.87?	0.0000
30	29.99	0.8660						

The above gives the exact arithmetical data needed for computing the weight of the earth. The result is 13,150 followed by 21 figures, or $13{,}150\times10^{21}$. This computed weight refers to the solid and liquid earth, and does not include the atmosphere.

(2). *The computed weight of the atmosphere.*—The atmosphere covers the earth in a very unequal layer, so that even at sea level in some places the pressure is as high as 31 barometric inches, and in other places is not higher than 29. From careful measurements on Buchan's charts of the mean annual pressure over the whole globe, Ferrel found that the average air pressure at sea level for each zone of latitude is about as given in the preceding table. (See Ferrel's "Contributions to Meteorology," No. 1, p. 400, or Waldo's "Elementary Meteorology," p. 96). The figures here marked with a query are supplied by extrapolation, and are slightly less reliable than the others.

Buchan's charts give the pressure as measured by a mercurial barometer reduced to standard temperature and gravity and sea level, they, therefore, assume air to be present where the continents and islands protrude above the ocean.

The figures in the accompanying table mean that at sea level the average weight of a column of air extending from that level up to the top of the gaseous atmosphere is balanced by or equivalent to the weight of a column of mercury of standard density, having a height of 29 or 30 inches, and pulled downward by the standard force of gravity at 45° and sea level, which force is that which gives the mercury its weight. We ordinarily say that the pressure of the atmosphere is about 15 pounds to the square inch, this is because a column of mercury 30 inches high and one square inch in section weighs about 15 pounds, but this is not exactly the weight of the column of air that has one square inch in section and reaches up to the top of the atmosphere. We have simply balanced the sea-level pressure of the air by the pressure or weight of a mercurial column which is under the influence of standard gravity, although the greater part of the air is under a slightly diminished gravity. But as in the previous section we weighed the earth under standard gravity so we also must do for the atmosphere; it must be imagined to be compressed into a small bulk and weighed at the same level as the mercury.

The ordinary barometric measurement, in which a tall column of atmosphere balances a short column of mercury, reminds one of a very refined method of determining the absolute value of the force of gravity. In this method one weight is suspended by a long wire, the other by a short one. The two weights balance each other perfectly when the wires are of equal length, but imperfectly if one weight is nearer to the earth than the other. The lower weight is said to weigh more than the other one, although they both have the same mass precisely.

A column of atmosphere many miles high, balanced by 30 inches of mercury at sea level, would counterbalance at least 30.06 inches if it were all brought down to the region where standard gravity prevails, or, in other words, the pressure of this column of air would be increased by two one-thousandths of itself.

The second column of the preceding table will give the average pressure at sea level for the whole atmosphere by making proper allowance for the diminution of the circles of latitude as we approach the poles; the circumferences are proportional to the cosine of the latitude, as given in the third column. The

resulting average pressure is 29.84 for the whole globe, being 29.910 for the northern and 29.774 for the southern hemispheres respectively. If we increase these figures by 0.06, we shall make an approximate allowance for the diminution of gravity with altitude. On the other hand, there is a slight diminution of this computed mass, amounting to about one per cent, owing to the fact that we have assumed air to exist where the continents really are.

The problem, therefore, resolves itself into this. The average pressure to be used is about 29.90 inches, or 2.492 feet of mercury. A cubic foot of mercury weighs about 848 pounds, therefore, the weight of the atmosphere above any square foot of the earth's surface is 2,117 pounds. If we multiply this by the area of the globe in square feet, we get the total weight of the atmosphere. According to Woodward's Smithsonian Tables, page LXV, this area is 198,940,000 square miles, and each square mile is $5{,}280 \times 5{,}280$ square feet. The result is 10,392 followed by fifteen figures, or $10{,}392 \times 10^{15}$.

The mass of the atmosphere is therefore so small a fraction of that of the solid earth that it is represented by $\frac{1}{1126000}$ or about one one millionth.

The preceding value is the lower limit of the mass of the atmosphere. Our knowledge of the physical and mechanical conditions existing in the upper air is so unsettled at present that, according to Prof. R. S. Woodward, there is a possibility that there may be nearly 1,000 times as much air belonging to our atmosphere.

THE WEATHER BUREAU IN ALASKA.

The Chief of Bureau has issued orders transferring the central station of the Alaskan section of the Climate and Crop Service from Sitka to Eagle on the Yukon near the British line. Mr. H. L. Ball, the section director at Sitka, will return to the States, and the work in Alaska will be placed in the charge of Mr. U. G. Myers, who has been connected with the Weather Bureau for a number of years, and for the past twelve months has been in the region in which the new central station will be located. Owing to poor facilities for communication Mr. Ball found it impracticable to establish stations at interior points, and it is believed that by the change that has been ordered it will be possible to establish a number of stations in the upper Yukon region, from which it has been heretofore impossible to procure meteorological observations. The Bureau has already in its possession records covering several years of observations at Sitka, and also at other stations in the coast region, but at points far in the interior it has been almost wholly impossible to secure observations, although numerous efforts in that direction have been made. Mr. Myers' residence of the past twelve months in Alaska, and his determination to remain in that territory for some years to come, encourages the Chief of the Weather Bureau to believe that in the next few years most valuable information will be obtained concerning the climate of this region, of which so little is at present known. While the value of the observations at Eagle alone will amply justify the change that has been ordered, it is expected that Mr. Myers, with headquarters at Eagle, will be able to establish a number of voluntary stations at hitherto inaccessible places in the interior. Mr. Myers is a resolute and courageous young man, possessing mental and physical qualifications which especially fit him for the arduous duties and hardships involved in a residence in this inhospitable region. The station at Sitka will be maintained under Prof. C. C. Georgeson, who has charge of the agricultural experiment work in Alaska. Professor Georgeson will also have his assistants conduct meteorological observations at various points, at which they may be located in the prosecution of the experimental work under their charge.

SOLAR HALO.

Mr. James Hyatt, of Stanfordville, Duchess County, N. Y., reports a halo seen February 1, 1899, between 3 and 3:30 p. m., eastern standard time, consisting of an arc of prismatic colors, and convex to the sun, distant 46° from it and subtending an angle of about 50°. There were no other attending fragments of a halo and no parhelia.

It is rather rare that one observes this portion of a halo without any attending portions, but it is by no means unknown. The occurrence depends upon a rather rare combination of temperature and the altitude of the sun. This halo can only be formed when the sun's rays pass through crystalline needles of ice that are slowly descending through the atmosphere. The rays must enter the prism through faces or facets that are inclined to each other at an angle of 54° 44′. In higher latitudes, where halos frequently occur, the sun is generally so low down that a great variety of halo phenomena can be seen; but in these southern latitudes, when the ice needles are favorably located in the air, the sun is so high up that we see only the upper portion of the halo. On February 13, 1895, between 8:45 and 9:15 a. m., a similar phenomenon was seen at Washington, which is described and explained at page 56 of the MONTHLY WEATHER REVIEW for that date.

FREQUENCY OF INJURIOUS PHENOMENA.

A correspondent at Beaufort, S. C., says:

Why do we now have disastrous cyclones in this neighborhood about every two years, whereas twenty-five years ago they were of rare occurrence? And, again, why do we now have unusually severe cold spells, whereas formerly it was only at long intervals that orange trees were killed by cold snaps? Are not these changes due to the destruction of forests in the northwest?

The answers to these questions may interest many of our readers and are about as follows:

(*a*) The destruction of forests in "the northwest," no matter whether this term refers to the Appalachian Range or the Ohio Valley and Michigan, or Wisconsin and Lake Superior, or the Rocky Mountain region, or the Pacific Coast States, can not have had any appreciable influence upon the climate of the coast of South Carolina.

(*b*) An examination of the records that are available for study, during the past hundred years, shows that there has been no remarkable increase in the number of either cyclones or cold spells. The word "cyclone" is evidently used by our correspondent in the sense of an extensive storm, similar to the West Indian hurricanes, and not in the sense used in the Western States, where it has unfortunately been misapplied to the tornado.

(*c*) The atmosphere of the whole globe is everywhere subject to irregular variations, as well as to regular daily and annual variations in its temperature, moisture, winds, and storms. These irregular variations do not appear to depend directly upon anything outside of the air, such as the sun and moon above us, the changes produced by man on the surface of the earth below. They are as peculiar to and inherent in the atmosphere as the currents and ebullitions in a pot of boiling water or the eddies in a river during a flood are peculiar to those fluids. The cause and probable continuance of any unusual frequency of storms or frosts can not at present be definitely stated. If the records of these phenomena were precise and definite and extended over many years, for any given locality, we could calculate the probability that two or more would accidentally occur within a short period of time. Such computations have been made for other places, and have shown that there is no reason to think that a rare combination of years of disastrous meteorological phenomena will recur more than two or three times in a century.

In our inability to analyze the exceedingly complex interaction of the ocean and the land and the atmosphere, we ordinarily say that, so far as we are able to see, the occurrence of unusual combinations of weather is governed by the laws of chance. By this we simply mean that the laws of chance will tell us how many such combinations will occur in a century just as well as would the natural laws that we know must govern them. But the physical laws will give us the years and dates of the occurrence, whereas the mathematical laws of chance simply give us the statistical frequency of occurrence. Both these laws, however, will agree in showing that unusual combinations of events in one year will not be followed by similar combinations several times in rapid succession.

BAROGRAPHS ON SHIPS.

In the MONTHLY WEATHER REVIEW for December, 1898, p. 567, we have referred to the first barograph used by any ship on the Great Lakes. Concerning this important subject Mr. Norman B. Conger, local forecast official and marine agent, states that the article quoted by us from the Evening Herald of Duluth had first appeared on December 30 in the Detroit Journal, and was written by himself. The fact that it was forwarded to the Central Office by Mr. Richardson had led us to a misapprehension as to the authorship. Mr. Conger's article of December 30 seems to be of sufficient importance to justify its reproduction in full. What he says about the use of the barograph on the Great Lakes is equally true of the oceans. The barograph was introduced on ocean vessels twenty years ago as a means of obtaining continuous records for scientific study, but it was soon found that its practical value to the navigating officer was of even greater importance.

It appears that the original introduction of barographs was due to the suggestion of Mr. T. F. Townsend, in 1892, then inspector in the Weather Bureau, but now section director at Philadelphia. Captain Townsend interested Capt. James Martin, master of the steamer *Roanoke*, plying between Milwaukee and Grand Haven at that time. The purchase of a barograph by Captain Martin followed at once, and it was used by him until his death, several years later. The *J. D. Moran* was the first vessel to be supplied by the Weather Bureau.

The present state of the subject is shown in the following copy of Mr. Conger's article:

The United States Weather Bureau has met with all manner of discouragements in its efforts to introduce the barograph, or self-registering barometer, among the vessel masters of the Great Lakes. The first barograph used on the lakes was placed by the Bureau in the steamer *J. B. Moran* in 1892, but it was not until this season that the instrument was given a fair test.

When the marine work of the Bureau was resumed this season (1898) there were forty barographs placed by the Chief of the Bureau in the hands of masters of boats of representative firms on the lakes, so that each firm, as far as possible, would be presented with one barograph. All of them were distributed during the season and used by masters who took the records of each week and returned them to the Detroit office where duplicates were made. The original records were filed at Washington and the duplicates returned to the masters.

The record sheet gives practically a record of the vessel's course and weather while on her trip. It shows the actual condition of the air pressure for the entire period, the state of the weather, the force of the wind, and the location of the boat at noon each day are noted thereon daily by the masters, so that the sheets can be referred to at any time and the actual condition of the weather ascertained.

The prime object of placing the barographs on the Great Lakes in the hands of the masters was to educate them in the practical use of the barometer in connection with the daily weather map issued by the Bureau. When they get the weather map as they leave or pass some principal port, the masters observe where the storm centers are and the actions of their barographs inform them of the subsequent movements of the storm. So, whether lying in port or on the bosom of the lakes, with a careful study of the weather map and by watching the action of the barograph the master can keep fairly well informed of the progress of storms. These instruments show with great exactness and cacuracy the action of all squalls during the summer by decided and rapid fluctuations.

During the season, masters who have had the use of these valuable instruments have said that they have received great benefit from watching the action of the barograph on their trips, and those placed on passenger steamers have saved the passengers many a hard shaking up, while they have enabled the freight steamers to make better time and with better weather.

The placing of the barographs on lake steamers was in a manner an experiment, as all vessels are supplied with the common aneroid barometer. Masters, in watching the actions of these instruments, do not get the benefit of the sudden changes which occur on the lakes, and are shown by the barograph, and for this reason many of the lake masters did not attach that importance to the use of barometers and the weather maps that they should.

A master, in leaving Buffalo for the upper lake ports, is in full communication with the Weather Bureau at least every twenty-four hours by receiving a weather map or a copy of the forecast, and it appears that there is no sufficient reason why the study of barometers should not be more general in connection with the navigation of boats. During the summer season there is probably not so much necessity of a careful scrutiny of the barograph as during that period in which the weather is more settled, and the storms, a few local squalls, are practically all that may be anticipated, and these are surely foretold by the barograph. During the fall, when the stormy season begins, a close attention to the weather map and action of the barometer will give much better results than could be anticipated from taking the weather as it comes without any foreknowledge of its intensity.

Of the 40 masters who used the barograph during the season, only three have said that its use was not of sufficient importance to them to be further desired, but two of these have since said that they would be glad to retain the instrument if it was desired by the Bureau.

The care required by the instrument is very slight, simply to change the record sheet once a week and wind up the clock, to record each day the state of the weather, the force of the wind, and the location of the vessel at noon. These record sheets are valuable for study, both to the master and the Bureau, and there is no doubt but that the Chief of the Bureau would be pleased to furnish all masters who have barographs on their vessels with the necessary record sheets in order that this valuable data may be placed within the reach of the Chief for the study of marine work on the lakes.

The one valuable feature of the barograph over the common aneroid barometer is that the barograph tells the story of the rise and fall of the pressure of the air at all times, so that should the master be absent from his cabin for some time and then return, the barograph informs him immediately of what action has taken place in the weather during his absence. The common aneroid does not make a record of these changes, and, in consequence, the master loses information which might be very valuable to him.

It is thought that with the intelligent use of the barograph in connection with the information which is freely furnished by the Weather Bureau, there will be a lessening of the number of disasters which occur through weather conditions, and, therefore, a material decrease in the losses of vessel property.

Many masters refused the aid of the barograph because they were not "fair weather sailors." They said that their boats were built to withstand all the storms that occur, and that they were expected to force their boats along through fair weather and foul. The weather men met them with the argument that they were not expected to run for shelter every time that the barograph indicated a blow. By studying the barograph and the weather maps the master becomes his own weather prophet. The maps show the storm tracks, so he is enabled to arrive at the direction and velocity of the approaching storm. This gives the master a chance to choose his course so as to dodge the worst of the gale.

WHY DO BIRDS MIGRATE?

It is commonly thought that birds migrate because of the changes in the weather; that they seek in winter a warmer and in summer a cooler climate, so as to avoid being subjected to great vicissitudes of temperature. But naturalists tell us that the migrations are largely a matter of the search after food. They leave a given region because a specific food is exhausted, and they fly to another specific region because the experiences of the tribe as a whole have shown that desirable food can be found there. They are driven by hunger out of one place and are led by experience to another. It is not the winds that drive them, nor is it the temperature that tempts them.

We are led to these remarks by the following extract from a letter by F. W. Corliss dated St. Brides, Norfolk County, Va., February 14.

To-day closes the most stormy period I have yet seen in the south. But few hours of sunshine for two weeks, rain and cloudy weather with cold winds.

No matter what the weather was, rainy, sunshine or cloudy, great flocks of robins, meadow larks, and other birds were flitting across the pasture and lawn.

* * * * * * * *

Snow commenced falling about 4 o'clock p. m. on Saturday and continued almost incessantly for fifty hours, wind north to northeast, northwest and nearly due west, with thermometer registering 20° above zero on an average, sometimes dropping to 14°, then rising to 24°. But when the snow ceased falling the thermometer dropped to 4° above zero this morning at 6:30 o'clock; 10° colder than I have seen yet in this part of the State. I think the depth of the snow was at least 8 inches; it lies in drifts 2 and 3 feet deep.

ICE JAM IN THE NIAGARA RIVER.

The ice jam in the northern or lower portion of the Niagara River is worth putting on record. According to the Post-Standard of Syracuse the Niagara River is frozen over from Lewiston down to Youngstown for the first time in twenty-two years. An ice jam formed along the river on February 13 and the river was frozen solid on the 14th from the base of the Falls to Lake Ontario, except at the Rapids. Above the Falls the ice is packed in high piles in the river. Much dynamite has been exploded to drive the ice from the inlets leading to the different power plants. In the gorge at the foot of the Falls some of the ice hills are nearly fifty feet high and one is said to be over a hundred feet high. Such a large quantity of ice has not been seen in the Niagara River for many years.

INTERNATIONAL CLOUD NAMES.

In the MONTHLY WEATHER REVIEW for July, 1898, p. 312, we have reprinted the description of the international symbols, as published in a circular of January 1, 1894, by the Weather Bureau. This was done in response to several requests for more information on this subject. At a subsequent meeting of the International Meteorological Committee, August, 1894, a system of abbreviations for the names of clouds was adopted, which is published on pages 18–19 of the Instructions for Weather Bureau Observers, dated October 1, 1895. So far as concerns the use of these abbreviations for clouds these pages of the instructions first went into effect at Weather Bureau stations in 1896, according to Instructions No. 56, dated June 19, when the modified code for telegraphing clouds was also authorized. In order that there may be no doubt that the last paragraph in column 2 of page 312 of the MONTHLY WEATHER REVIEW for July, 1898, is replaced by current instructions, the abbreviations now in use are reprinted as follows from pages 18–19 of the Instructions of October 1, 1895, to Weather Bureau Observers:

1. Ci.	Cirrus.	8. Cu.	Cumulus.
2. Ci. S.	Cirro-stratus.	9. Cu. N.	Cumulo-nimbus.
3. Ci. Cu.	Cirro-cumulus.	10. S.	Stratus.
4. A. Cu.	Alto-cumulus.	11. F. N.	Fracto-nimbus or scud.
5. A. S.	Alto-stratus.	12. F. Cu.	Fracto-cumulus.
6. S. Cu.	Strato-cumulus.	13. F. S.	Fracto-stratus.
7. N.	Nimbus.		

INCREASE OF SNOW WITH ALTITUDE.

In connection with reports from Colorado, alluded to on page 62, we take the following from the February report of Mr. W. S. Palmer, section director for Wyoming. The snow on the ground at the end of the month is reported as follows:

Station.	Altitude.	Snow on ground.
	Feet.	*Inches.*
Dome Lake	8,821	48
Laramie Peak	.....	25
Snowy Range	8,700	55
Do	9,000	81
Do	10,000	98
Do	11,000	136

THE DATE OF THE MONTHLY WEATHER REVIEW.

The Editor occasionally receives a complaint to the effect that the MONTHLY WEATHER REVIEW for any given month is published too late or contains ancient data, or is in some other respects not quite up to the standard of the critic.

Perhaps it is as well to say that the MONTHLY WEATHER REVIEW carries the number and date of the month to which the greater part of the climatological statistics refer. In order to gather together this data as promptly as possible all the forms for a given month, both for regular and voluntary stations, are expected to be filled out, summarized, checked, and received at the Central Office in Washington by the 25th of the following month; of the more distant stations, only those in Alaska are excepted. As soon as received at Washington the data is entered upon the forms corresponding to the climatological tables and charts that appear in the MONTHLY WEATHER REVIEW. The work of the draughtsman, the compositor, and the proofreader begins at once and occupies at least two weeks, from the 25th until the 10th of the following month. The first copies of the complete MONTHLY WEATHER REVIEW are due on the 15th, or six weeks after the close of the month. The other portions of the REVIEW relative to forecasts, rivers, crops, and the short articles contributed to the text are usually prepared before the work on the climatological tables begins.

The Weather Bureau is allowed to maintain a very small printing office, and the publication of the REVIEW is accomplished wholly at this office. Delays must sometimes occur, owing to sickness, or the press of other work, or to the addition of a few extra pages and charts. It, therefore, frequently happens that instead of receiving the MONTHLY WEATHER REVIEW within seven weeks after the close of any month, our correspondents will find it delayed a week or two longer. Thus, the REVIEW for December, 1898, did not appear until March 17, an arrearage of four weeks, due largely to orders for special work, which latter always takes precedence over the REVIEW.

Although the REVIEW relates principally to the meteorology of the month whose name it bears, yet it is not absolutely restricted thereto, but also includes belated data from distant stations, and even interesting items or special contributions received after the close of the month.

FORECASTS ON LETTER BOXES.

Mr. F. P. Chaffee announces in the February report of the Alabama section that—

Through the courtesy of the postmaster at Montgomery, Ala., the daily forecasts of the Weather Bureau will be posted on all street letter boxes in that city. The carriers who collect the mail will post the forecast cards, which will thus be widely distributed locally by about 1 p. m. of the date of issue.

It would now seem as though the daily distribution of the forecast cards is in a fair way to become the most popular and efficient method of distributing the regular morning pre-

dictions, but as Mr. Chaffee remarks in another column nothing will replace the careful study of the morning weather map whenever that is accessible. Every one should familiarize himself with the typical conditions shown on the maps in order to anticipate severe frosts, floods, gales, and other calamities.

THE DEPTH OF ATMOSPHERIC COLD WAVES.

By means of the kite we shall, undoubtedly, eventually ascertain the depth of the layers of cold air that flow southward over the Mississippi Valley. Meanwhile, we may bear in mind that ever since the establishment of the Weather Bureau stations at Cheyenne and Santa Fe, in 1870 and 1871, it has been well known that most of these cold waves are very shallow. In his February report Mr. F. H. Brandenburg, section director for Colorado, says that the cold waves for this month do not appear to have extended to a great height, since the mean temperature of the plains region was lower than that of the adjacent mountain districts, which are five or six thousand feet higher. The latter regions were usually cloudy with an abnormal and unparalleled amount of snow, while the plains were relatively clear and subject to intense radiation. The average depth of total snowfall for the month is said to be 33 inches in the valleys, 66 inches at timber line, and 76 at higher elevations in the mountain region of Colorado. It is expected that many of the snowdrifts will last all summer, and there will, of course, be an abundance of water for irrigation.

THE BENEFITS OF SEVERE WINTERS.

Mr. J. B. Marbury, section director for Georgia, states that in many respects the severe weather of February was most beneficial to the farmer. The freezing and thawing greatly improved the condition of the soil. The land was softened and pulverized more thoroughly than long-continued plowing could have done; much natural plant food was rendered available for the next growing season; millions of injurious insects were killed. Many are already predicting a splendid crop year.

WEATHER VERSUS CLIMATE.

It is commonly said that the climate is the average weather of a century or some long period of time; that the climate represents normal or average conditions, while the weather is the temporary condition prevailing at any moment. Statistics have been compiled to show some of the relations between the average crops and the average climate. The present Editor has undertaken extensive works in this line, but summed it all up by saying that for crops raised out of doors the relation is too complex to present any results of positive value to either the farmer or the biologist. The fact is that the innumerable combinations between the varying conditions of weather, soil, and plant will, at any stage of growth, affect the plant and crop to an important extent. It is the weather and not the climate that is of importance to the farmer. The weather is everything, the climate is an abstract idea that has very little interest for him. For example, Mr. C. F. R. Wappenhans, Section Director for Indiana, states in his February Report that where the wheat was well protected by snow, the exceedingly cold weather did but very little injury, whereas in the northern portion of the State where but little snow had fallen, many fields appeared to be injured. In some places, although the top of the plant looks brown and dead, yet it is still green lower down near the surface of the ground. Such illustration might be cited for every variety of plant in every variety of location. It is the combination of the weather with peculiarities of the soil and plant that produces favorable or unfavorable conditions. Plants are sometimes injured in the Southern States by a cold wave because the preceding warm weather had developed them rapidly, while on the same date those in northern regions escaped uninjured because the steady cold weather had retarded their development.

Most of our fruits and grains are being cultivated in regions that are far removed from their native habitats. We have spread all over the United States the peaches that came from Persia, the corn from central Mexico, the wheat from Egypt and India, and so on indefinitely. The success in raising profitable crops in any part of the country must depend upon the frequency with which injurious weather conditions recur. A favorable locality is not one whose average climate is favorable, but one in which the extreme severities of the weather do not recur too often. The cultivation of peaches, oranges, grapes, and other fruits whose plants require five or ten years to mature, may be profitable if killing weather does not recur oftener than once in ten or twenty years. Tobacco and cotton and the grains that must be started annually, may be cultivated profitably if bad seasons do not recur oftener than once in five years.

We would invite our readers to review carefully their own personal knowledge of local crops in their respective districts and communicate to us a statement as to the dates and manner in which any given plant or crop was injured by the weather at any time during the past ten years. When a cold spell occurs it is commonly stated that this has destroyed the peaches or the corn, or has injured the tobacco, etc., but these statements are often mere guess work. We believe them implicitly at the time, and yet the resulting crop turns out about as usual, showing that our judgment was quite erroneous. As a rule, during the months succeeding a disastrous freeze, Nature does her best to repair the damage, and often succeeds to a surprising extent. The plant has within it what may be called a power to struggle against adversity and to accomplish a crop if this be not entirely impossible.

We commend to all the careful study of the true relation between the weather and any given crop, and a determination of the relative frequency of good, average, and poor years.

EXPERIMENTS IN PROTECTION FROM FROST.

In the February report of the Louisiana section Mr. Alexander G. McAdie, who is about to return to San Francisco, Cal., gives some account of the extensive system of experiments undertaken at Woodland, near Diamond, La., as a study of methods of protection against frost. It seems that the orange grower in Louisiana is concerned only with the protection of the tree during the months of January and February, for the fruit itself has never yet been injured by frost. The cold weather of February, 1895, destroyed nearly all the orange trees except in the extreme southern portion of the State, not more than 60 miles from the mouth of the Mississippi. On the other hand, the experiments at Woodland, which is about 43 miles south of New Orleans and about 20 miles north of the limit just given, have shown that by flooding the whole orchard at any time the injuries produced by ordinary freezes may be averted. Possibly the freeze of February, 1895, could have been thus nullified, but the still more severe freeze of February, 1899, demanded extra precautions. In addition to the flooding there were tried smudges and matting and hilling up the earth around the trees. The injury done by the freeze of this current month was aggravated by the fact that the extremely warm weather of the 3d, 4th, and 5th of February had started the sap and forced the growth so that the trees were killed or badly injured by the freeze of February 12–13, except in the section where the

earth was hilled up around the trees. There is reason to believe that the latter method of protection saved that portion of the orchard, although the temperature must have been about 10° Fahrenheit on the 13th.

THE DUST IN THE ATMOSPHERE.

An excellent article on dust contributed by A. H. Thiessen, observer, to the February number of the Report of the Montana section, leads us to suggest that those interested in adding to our knowledge of this subject, should make use of the dust counter devised by Mr. John Aitken and then described by him on pages 734–754 of his article in Weather Bureau Bulletin No. 11, part 3. The original dust counter has received several successive modifications and in its present form has become a portable or pocket instrument which packs into a case about the size of a well filled cigar case; it can, we believe, be obtained at a comparatively slight cost by addressing Mr. Aitken, directly, at Darroch, Falkirk, Scotland.

THE UTILITY OF THE WEATHER BUREAU LIBRARY.

For several years past the Chief of the Weather Bureau has endeavored to eke out the limited facilities for study and scientific reading available at our regular Weather Bureau stations by circulating copies of certain journals devoted to the progress of science in general. In addition to this the attention of the observers at our regular stations should be called to the fact that if there is any book in the library of the Weather Bureau that they desire to consult, it can easily be sent to them for that purpose. It is desirable to make the library as useful as possible to the service.

Of course, books should not be kept out very long owing to the probability that others will also wish to see them, but it is a great deal better to have the use of the original memoir of an author, if only for two weeks, than to rely upon abstracts and reviews by others. The Weather Bureau observers are invited to make full use of the library in order to familiarize themselves with recent advances in meteorology and its applications to the needs of the community.

THE BLESSING OF COLD WEATHER.

The great cold wave of February gives occasion for some remarks under the above heading in the News and Courier, Charleston, S. C., February 26:

> It is something to be proud of that we have seen zero and still live. * * * Mississippi and Louisiana may at least be reasonably certain that the yellow fever, which for the past two years has lingered in concealment, has been effectually slain by the cold. * * * Charleston will be all the better for the freezing process and the loss she has sustained in early vegetables and fruit will be more than compensated in other ways. * * * The loss falls on special individuals but the whole community is benefited.
>
> It is fortunate that physicians have at least discovered that the old idea that warmth is essential to the cure of all kinds of lung diseases is a mistake and that they now recognize that cold, dry air will do more for the sufferers than the tropic climates of the south.

RECENT EARTHQUAKES.

Through the kindness of Commander N. Sebree, U. S. N., lighthouse inspector, Mr. John F. Ingersoll, keeper of the Point Sur Light station, 36° 25′ N., 121° 55′ W., on the coast of California, reports on the earthquake of February 7 as follows:

> The tower is built on solid rock; the second assistant keeper was on watch in the tower, sitting down reading. There has been no earthquake here recently. The time when the shock was felt was 8:55 p. m., standard railway time, viz, one hundred and twentieth meridian time. The clock was compared with the Western Union clock in Monterey on the 9th. The shock only lasted one or two seconds. There was only one shock felt; it was very light and not noticed generally. There was no other cause than earthquake for the jar felt here. The jar came horizontally from the east; the clock in the tower faces the east and the jar caused the pendulum to strike the front and sides of the clock, but the clock did not stop.

February 8–9, several reports published in the Chicago papers state that earthquake shocks were felt about 11 p. m., February 8, and at 12:30 a. m., 1 a. m., 3 a. m., and between 3 a. m. and 4 a. m., also some time after 6 a. m. of the 9th.

Mr. J. J. Cox, forecast official, Weather Bureau, reports that several shocks, felt yesterday and this morning, may have been an earthquake, but are quite as likely to have been due to the freezing and cracking of huge icefields in the Lake.

February 9, several shocks are reported from Belen, N. Mex.

February 13, light shocks at Napa and Sonoma, Cal.

February 13, an earthquake was felt distinctly at Lynchburg, Va., during the great blizzard of that morning; many persons were awakened, buildings shaken, and furniture moved; it was considered more violent than any that has been felt there in recent years.

February 13, at Mount Airy, N. C., at 4 a. m., lasting ten seconds; at Charlotte, N. C., at 4:30 a. m., oscillations from southeast to northwest.

On February 13, 4:30 a. m., the citizens of Winston, N. C., were awakened by four severe earthquake shocks.

February 13, an earthquake shock with grinding noise was felt at 4:35 a. m., (evidently eastern standard time) at Radford, in southwestern Virginia. A distinct shock was also felt at Martinsville, Henry County, Va., and the shock was felt throughout that part of the State. An earthquake of from 5 to 10 seconds duration was felt in eastern Tennessee at 3:30 a. m., of the same date (evidently central standard time).

Professor Marvin states that no earthquake was recorded on the Washington seismograph on this date.

February 24, light shock at San Bernardino.

BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

Prof. Charles E. Thorne, on behalf of the library of the Ohio Agricultural Experiment Station, at Worcester, Wayne County, Ohio, states that he has a number of odd numbers of the MONTHLY WEATHER REVIEW for the years 1876–93, and desires, by exchange or otherwise, to complete the files of the library of that station by obtaining the complete volumes for the years previous to 1881, and individual numbers for subsequent years, as follows:

1881. February, March, May, December, Summary.
1882. All after July.
1883. Summary.
1884. February, August, December, Summary.
1885. All after June.
1886. The entire volume.
1887. January, February, May, Summary.
1888. Summary.
1890. January.
1894. June.

THE WEATHER BUREAU AND THE ICE BUSINESS.

We take pleasure in noting that, according to The Ice World, a journal published at Albany in the interest of the

ice business, the ice men of New York have been following the forecasts of the Weather Bureau very closely and laying out their work according to the prognostications. They say:

The difference in the results obtained under the new and old system is as great as the difference in the products of the wild and the cultivated soil.

When a report shows that a cold wave is approaching, the superintendent gives orders to have the ice plowed, if it is not already of sufficient thickness. The cold settles down through the grooves or furrows, and as a result the ice making progresses about twice as fast as it otherwise would.

Then, again, when the field is covered with snow the forecasts determine to the superintendent the course to be pursued. If the weather is to continue cold the field may be cleared in its entirety, but if bright sunshiny days are in prospect the only wise course is to uncover just that section of the field upon which work is progressing and leave the rest protected from the ravages of the sun by the mantle of snow.

HISTORY OF WEATHER PREDICTIONS.

Referring to some remarks by Mr. Charles Foster, jr., in the MONTHLY WEATHER REVIEW for January, 1899, page 17, the Editor solicited further information from him. Mr. Foster had fortunately preserved a copy of an article published by him as an editorial in the Windham County Gazette in the year 1837 or 1838. We take pleasure in reprinting this fragment of early history. Its colloquial style introduces us to the popular editor of a successful country paper sixty years ago. The time is not so far distant when one had to apologize for entertaining such bold ideas and for daring to oppose the narrow views of those who had spent their lifetime in small villages. Since the days of the landing of the *Mayflower*, each successive generation in New England has distinguished itself by a gradually wider departure from the thoughts and customs of its predecessor. There has been a reaching out after new knowledge, in the hope and belief that the truth would make us free.

Espy, Redfield, Ferrel, and Loomis, as meteorologists; Henry, as physicist; and Morse, as inventor, rapidly developed the ideas that were necessary in order to enable the country to realize the predictions expressed in Mr. Foster's article.

THE WEATHER.

The weather is something which interests everybody, and there are many signs supposed to indicate changes and storms, but nothing, as yet, which seems to definitely settle the matter. A few days ago we were at the grist mill and and had a long talk with the miller, Mr. James Stevens, whom most of our readers know, and all will remember. He has a weather ken, sharply observes clouds, notes winds, temperature, etc. He has settled many points as to storm conditions, but says he lacks essential elements to focus things to definite results. He said we could deal with generals, but were short on particulars. We suggested that storm and weather conditions should be studied outside of local limits, be extended over wide areas as near simultaneously as possible; that if Government would undertake observations extending across the continent, the observation lines to run parallel at distances sufficiently apart to catch every phase of what was supposed to be causative of changes, then, when the observations were collated and digested, there would be the necessary data to determine the cause of changes and the law of storms. He concurred in this opinion, believed in this way we might tell where and when storms would gather, and mark out their course and strength. He laughingly said, "Some people would call us crazy, and say it would be wicked to pry into the mysteries of God's Providence, but such stuff is watered moonshine. God never meant to have men die fools, with the opportunities of learning that he has set around about." Such was the substance of our talk. We think it was pretty good common sense, which one day will creep under the skull of some official, and set in motion the machinery of weather observation. We believe it is possible to predict storms, and feel pretty sure it will be undertaken at no distant day. To do it the Government will not step outside of its proper functions.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Chief of Division of Records and Meteorological Data.

Table I gives, for about 130 Weather Bureau stations making two observations daily and for about 20 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for 26 stations selected out of 113 that maintain continuous records, the mean hourly temperatures deduced from the Richard thermographs described and figured in the Report of the Chief of the Weather Bureau, 1891–92, p. 29.

Table IV gives, for 26 stations selected out of 104 that maintain continuous records, the mean hourly pressures as automatically registered by Richard barographs, except for Washington, D. C., where Foreman's barograph is in use. Both instruments are described in the Report of the Chief of the Weather Bureau, 1891–92, pp. 26 and 30.

Table V gives, for about 130 stations, the arithmetical means of the hourly movements of the wind ending with the respective hours, as registered automatically by the Robinson anemometer, in conjunction with an electrical recording mechanism, described and illustrated in the Report of the Chief of the Weather Bureau, 1891–92, p. 19.

Table VI gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table VII gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table VIII gives, for about 70 stations, the average hourly sunshine (in percentages) as derived from the automatic records made by two essentially different types of instruments, designated, respectively, the thermometric recorder and the photographic recorder. The kind of instrument used at each station is indicated in the table by the letter T or P in the column following the name of the station.

Table IX gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table X gives the record of excessive precipitation at all stations from which reports are received.

Table XI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

NOTES EXPLANATORY OF THE CHARTS.

Chart I.—Tracks of centers of high areas. The roman letters show number and order of centers of high areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the highest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a ridge of high pressure.

Chart II.—Tracks of centers of low areas. The roman letters show number and order of centers of low areas. The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. The queries (?) on the tracks show that the centers could not be satisfactorily located. Within each circle is given the lowest barometric reading reported near the center. A blank indicates that no reports were available. A wavy line indicates the axis of a trough or long oval area of low pressure.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level pressure, temperature, and resultant surface winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.

Chart V.—Hydrographs for seven principal rivers of the United States.

Chart VI.—Surface temperatures; maximum, minimum, and mean. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

Chart VIII.—The total snowfall. This is based on the reports from all available observers and shows the depth of the snowfall during the month in inches. In general, the depth is shown by lines and areas of equal snowfall, but in some cases figures are also given for special localities.

Chart IX.—Depth of snow on ground. This chart is based essentially upon reports from regular and special observers and shows the depth of snow lying on the ground at the end of the month, which is, therefore, the accumulated excess of the snowfall over its loss by melting, evaporation, and settling.

TABLE I.—*Climatological data for Weather Bureau Stations, February, 1899.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. and 8 p. m. + 2.	Mean reduced.	Departure from normal.	Mean max. and min. + 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							24.5	— 2.7									76	3.80	+ 0.2									5.9	
Eastport	76	69	74	29.80	29.90	— .06	30.4	— 1.6	45	18	26	— 6	11	15	26	18	14	76	3.35	— 0.4	10	8,504	w.	72	ne.	13	9	8	11	5.8	24.3
Portland, Me	108	81	89	29.51	29.92	— .09	22.3	— 2.3	51	21	29	— 6	11	16	26	18	13	70	3.41	— 0.1	10	5,342	nw.	48	n.	13	10	9	9	5.3	27.5
Northfield	872	15	65	28.99	30.01	— .05	15.5	— 0.5	48	22	25	—25	12	6	45	13	9	79	1.69	— 0.4	9	6,246	s.	44	n.	14	5	10	13	6.5	25.0
Boston	135	115	181	29.84	29.98	— .06	26.8	— 1.2	54	20	34	— 4	11	20	25	23	17	70	3.03	— 0.5	15	8,745	w.	42	ne.	8	12	3	13	5.3	30.2
Nantucket	14	43	54	29.97	29.98	— .10	28.6	— 2.4	47	21	34	— 2	11	23	24	26	23	84	4.53	+ 1.6	17	9,292	nw.	52	ne.	13	9	4	15	6.6	30.1
Woods Hole	22	51	57	29.95	29.97	— .06	26.1	— 3.6	46	27	32	— 5	10	20	25	24	19	76	4.10	+ 0.4	14	11,636	nw.	72	nw.	14	10	4	14	6.0	19.4
Vineyard Haven	.....	20	....	.....	.....	.....	29.3	— 3.0	53	22	35	2	11	24	24	....	....	....	6.37	+ 3.2	16	7,441	nw.	40	ne.	13	7	7	14	6.4	22.4
Block Island	27	39	48	29.97	30.00	— .06	26.4	— 4.4	47	27	31	0	11	22	19	25	20	76	4.96	+ 0.6	16	12,145	nw.	71	n.	13	9	10	9	5.6	22.2
Narragansett	.....	10	....	.....	.....	.....	25.4	— 3.7	50	6	33	— 8	10	18	29	....	....	....	3.25	— 1.3	14	.....	nw.	....	.....	...	15	1	12	....	22.0
New Haven	107	118	140	29.90	30.02	— .06	24.6	— 4.2	55	21	32	— 9	11	18	27	22	17	76	3.39	— 0.7	15	6,998	n.	48	ne.	13	10	7	11	5.6	24.1
Mid. Atlan. States.							27.9	— 5.6									79	5.13	+ 1.8									6.1	
Albany	97	84	113	29.92	30.04	— .08	21.8	— 2.4	53	22	29	— 8	11	15	32	20	16	78	2.92	+ 0.3	11	5,417	s.	37	se.	28	4	10	14	7.0	27.5
Binghamton	875	79	90	.....	.....	.....	19.9	— 4.0	50	20	27	—15	11	18	35	....	....	....	2.63	— 0.2	15	4,588	w.	36	s.	26	6	6	16	7.2	19.4
New York	314	313	346	29.68	30.04	— .07	26.9	— 4.6	50	21	33	— 6	11	21	21	25	21	80	5.46	+ 1.7	15	11,149	nw.	64	s.	27	10	6	12	5.5	27.5
Harrisburg	377	94	104	.....	.....	.....	24.2	— 8.3	55	21	30	—13	10	18	30	....	....	....	3.71	+ 0.9	17	5,241	w.	36	nw.	13	8	9	11	6.2	22.8
Philadelphia	117	168	184	29.93	30.06	— .06	28.2	— 5.3	57	22	34	— 6	10	22	27	24	20	77	6.20	+ 3.0	16	7,802	nw.	43	se.	27	11	2	15	5.9	31 5
Atlantic City	82	68	76	29.99	30.05	— .08	27.2	— 6.7	50	22	34	— 7	10	20	27	25	22	84	3.78	+ 0.4	13	9,027	w	50	n.	13	8	10	10	6.0	27.9
Cape May	24	52	70	30.05	30.07	.....	27.6	— 8.1	51	27	33	— 3	10	22	30	26	....	....	7.03	+ 3.2	18	.....	n.	55	w.	27	10	6	12	6.0	47.5
Baltimore	123	68	82	29.98	30.07	— .05	28.4	— 7.8	60	22	35	— 7	10	22	25	20	75	5.47	+ 2.0	17	3,946	w.	30	n.	16	12	5	11	5.5	33 9
Washington	112	59	76	29.96	30.09	— .03	27.4	— 8.4	59	20	36	—15	11	19	41	24	20	78	6.17	+ 2.8	18	5,525	nw.	48	nw.	13	10	7	11	5.7	35.2
Cape Henry	.....	5	34	.....	.....	.....	35.8	— 8.1	68	22	43	5	14	28	26	....	....	....	6.75	+ 3.2	16	10,674	sw.	60	n.	13	6	8	14	6.8	18.5
Lynchburg	685	83	88	29.31	30.09	— .03	31.4	— 8.6	65	20	40	— 3	11	23	38	27	25	77	5.86	+ 2.3	12	3,228	nw.	35	nw.	14	11	6	11	5.5	12.0
Norfolk	92	102	111	29.98	30.08	— .04	36.4	— 6.4	71	32	45	— 3	14	28	31	33	30	86	5.55	+ 1.7	14	7,613	n.	38	nw.	13	10	5	13	5.6	14.4
Richmond	144	98	105	.....	.....	.....	33.0	.....	68	22	41	— 3	10	25	31	....	....	....	4.72	.....	15	4,706	n.	30	w.	27	9	6	13	6.2	20.2
S. Atlantic States.							44.0	— 5.5									80	6.43	+ 2.7									5.3	
Charlotte	773	68	76	29.23	30.09	— .03	37.6	— 7.4	73	4	46	— 5	14	29	32	33	28	74	7.91	+ 3.4	14	6,031	ne.	36	nw.	23	9	5	14	5 6	6.5
Hatteras	11	17	36	30.05	30.06	— .04	41.8	— 4.8	68	5	48	12	14	36	31	40	38	88	8.07	+ 3.6	12	10,815	n.	52	w.	13	10	6	12	5.8	4.5
Kittyhawk	9	12	30	.....	.....	.....	37.9	— 8.1	67	*	45	6	14	30	26	....	....	....	6.72	+ 3.0	12	10,284	.....	....	.....	...	10	4	14	6.1	7.1
Raleigh	375	93	101	29.69	30.11	— .04	37.0	— 6.9	72	4	46	— 2	14	28	34	33	29	78	7.48	+ 3.5	16	5,256	sw.	26	nw.	13	10	8	10	5.7	17.7
Wilmington	78	82	90	30.00	30.09	— .02	43.4	— 6.4	74	4	52	5	14	35	30	39	36	81	3.94	+ 0.7	12	6,832	ne.	36	nw.	13	8	8	12	5.9	5.0
Charleston	48	14	92	30.07	30.12	.00	49.2	— 3.6	76	4	57	7	14	41	31	44	39	75	4.82	+ 1.5	15	8,510	sw.	49	e.	16	6	15	7	5.8	3.9
Columbia	.....	5	....	.....	.....	.....	43.0	— 6.2	78	5	53	— 2	14	32	37	....	....	....	8.59	+ 4.4	15	.....	nw.	....	.....	...	7	10	11	5.9	11.8
Augusta†	180	89	103	29.89	30.09	— .02	45.2	— 5.2	76	5	54	3	14	36	28	40	36	76	10.03	+ 6.1	14	5,511	w.	33	nw.	23	9	5	14	5.9	6.7
Savannah	82	63	89	30.01	30.10	— .04	51.0	— 3.3	81	5	60	8	13	42	29	45	41	79	6.66	+ 3.6	14	6,844	nw.	36	nw.	23	6	16	6	5.6	2.0
Jacksonville	43	69	84	30.05	30.10	— .01	55.4	— 3.0	81	5	65	10	13	46	34	50	47	82	3.38	+ 0.2	13	5,912	sw.	40	sw.	7	11	7	10	5.6	1.9
Florida Peninsula.							55.9	— 1.2									83	4.50	+ 2.3									4.3	
Jupiter	28	13	30	30.05	30.08	— .01	66.8	— 0.3	83	7	73	28	14	60	31	62	60	82	4.64	+ 2.1	12	7,831	s.	38	nw.	13	12	10	6	4.9	
Key West	22	43	50	30.06	30.08	+ .01	70.2	— 1.2	81	22	75	44	14	65	21	66	64	86	2.89	+ 1.3	11	7,003	se.	49	nw.	13	13	9	4	4.4	
Tampa	36	60	67	30.05	30.09	— .01	69.6	— 2.2	80	26	70	22	14	52	33	55	52	80	6.27	+ 3.5	10	5,196	nw.	28	nw.	13	10	9	9	5.2	0.1
East Gulf States.							45.2	— 9.3									81	4.28	— 0.4									6.3	
Atlanta	1,131	92	126	28.88	30.12	— .03	39.5	— 8.5	70	3	48	— 8	13	31	27	35	31	78	6.62	+ 1.7	14	7,708	nw.	48	ne.	16	10	5	13	5.9	6.5
Pensacola	56	78	90	30.04	30.10	— .02	49.0	— 7.8	74	22	57	— 7	13	41	31	45	41	78	3.86	0.0	14	7,332	n.	38	n	12	10	4	14	5.8	2.1
Mobile	57	88	96	30.04	30.10	— .01	45.8	— 9.0	76	22	54	— 1	13	37	35	43	41	88	3.72	— 1.0	14	6,405	n.	33	n.	12	9	6	13	6.0	2.0
Montgomery	221	100	112	29.86	30.10	— .03	44.7	— 8.0	76	3	54	— 5	13	35	31	40	36	77	6.09	+ 0.8	12	5,815	nw.	34	e.	15	7	8	13	6.2	3.0
Meridian	375	84	94	.....	.....	.....	40.5	—13.1	76	3	50	— 6	13	31	35	....	....	....	3.97	— 1.9	14	5,105	nw.	30	se.	25	8	3	17	6.6	5.8
Vicksburg	247	65	73	29.81	30.08	— .04	40.8	—11.8	73	3	49	— 1	12	32	30	38	34	79	3.81	— 0.8	11	5,872	n.	36	sw.	25	9	4	15	6.3	6.7
New Orleans	54	112	130	30.03	30.09	+ .01	49.4	— 8.7	79	3	58	7	13	41	35	46	44	86	2.93	— 1.6	11	7,806	n.	41	n.	12	6	6	16	6.6	3.0
Port Eads	.....	27	....	.....	.....	.....	51.8	— 7.8	75	*	61	10	13	42	31	....	....	..	3.27	0.0	9	.....	n.	....	.....	...	11	1	16	....	0.1
West Gulf States.							41.1	—10.4									76	1.78	— 1.6									5.6	
Shreveport	249	77	84	29.84	30.11	+ .01	39.8	—11.4	75	21	49	— 5	12	31	32	35	29	69	1.63	— 2.5	11	5,766	se.	39	se.	25	11	2	15	6.2	2.8
Fort Smith	481	63	72	29.57	30.12	+ .03	31.8	— 9.7	71	20	42	—15	12	22	40	27	22	75	1.38	— 2.2	8	5,317	e.	29	w.	26	11	8	9	5.1	1.9
Little Rock	357	93	100	29.74	30.14	+ .03	33.0	—12.4	67	28	42	—12	12	21	32	29	23	71	1.74	— 3.6	8	6,677	nw.	38	nw.	23	10	9	9	5.4	1.2
Corpus Christi	20	42	50	30.03	30.05	— .02	49.2	— 9.8	85	21	57	11	12	41	29	46	43	85	1.08	— 1.4	6	7,613	n.	40	nw.	12	12	5	11	5.2	
Fort Worth	670	106	114	.....	.....	.....	35.0	.....	78	28	47	— 8	13	23	48	....	....	....	0.21	.....	4	7,974	nw.	36	sw.	25	14	7	7	4.6	0.9
Galveston	54	85	96	29.99	30.04	— .03	48.6	— 8.4	71	22	55	8	12	42	30	46	43	85	2.83	— 0.2	13	7,671	ne.	32	nw.	12	5	6	17	7.2	0.1
Palestine	510	54	61	29.53	30.10	+ .01	39.7	—11.3	74	28	49	— 6	12	30	36	36	32	78	3.46	0.0	13	5,687	n.	36	s.	25	10	3	15	6.3	1.6
San Antonio	704	95	104	29.31	30.08	.00	45.8	—10.0	89	21	57	4	12	34	37	39	32	69	0.31	— 1.6	5	7,087	n.	42	ne.	11	16	4	8	4.4	
Ohio Val. & Tenn.							27.4	—12.6									77	3.49	— 0.7									6.3	
Chattanooga	762	106	112	29.29	30.14	+ .02	35.6	— 9.9	67	20	45	—10	13	26	33	31	26	73	6.81	+ 1.2	16	6,232	sw.	40	nw.	23	10	5	13	5.9	2.1
Knoxville	1,004	10	88	29.02	30.14	.00	32.2	—10.1	65	20	40	—10	14	24	34	29	25	79	6.21	+ 0.9	14	6,163	sw.	44	nw.	5	11	2	15	6.2	6.9
Memphis	399	140	154	29.70	30.15	+ .03	32.0	—12.8	66	28	39	— 9	12	25	34	28	23	72	4.33	— 1.0	13	7,833	ne.	48	nw.	23	9	7	12	6.1	4.2
Nashville	545	128	134	29.53	30.15	+ .03	30.0	—12.7	71	20	38	—13	13	22	32	27	23	79	5.19	— 0.1	16	5,825	nw.	42	se.	25	8	6	14	6.4	5.0
Lexington	990	75	102	.....	.....	.....	24.5	—11.5	59	28	32	—20	13	18	30	....	....	....	2.84	— 0.9	14	8,201	w.	46	sw.	28	7	6	15	6.4	9.2
Louisville	535	114	126	29.52	30.12	.00	27.2	—11.0	65	26	35	—14	9	19	30	24	19	76	1.84	— 2.5	13	6,775	s.	38	sw.	28	6	6	16	6.7	7.9
Evansville	434	72	82	.....	.....	.....	25.6	.....	61	26	34	—15	9	18	28	....	....	....	2.10	.....	8	6,098	s.	38	sw.	28	13	3	12	5.2	9.4
Indianapolis	823	134	164	29.17	30.12	+ .02	22.0	—10.3	61	26	29	—18	9	15	32	19	14	74	2.08	— 1.5	11	7,794	s.	44	w.	26	5	11	12	6.2	4.2
Cincinnati	628	152	157	29.41	30.13	+ .01	24.6	—11.8	61	26	32	—17	9	18	29	22	17	74	2.04	— 1.6	12	6,330	sw.	36	sw.	28	11	6	11	5.7	8.4
Columbus	824	87	100	29.17	30.12	+ .02	22.8	— 9.3	60	20	30	—20	10	16	26	20	17	84	1.44	— 2.3	11	6,067	sw.	37	sw.	28	8	8	12	5.8	5.0
Pittsburg	842	116	123	29.14	30.10	— .02	25.4	— 8.0	60	21	33	—20	10	18	28	23	19	79	2.68	— 0.1	16	4,900	nw.	30	nw.	28	6	8	14	7.1	14.5
Parkersburg	638	77	84	29.41	30.14	+ .01	25.2	— 9.3	63	20	33	—27	10	17	34	23	19	79	2.96	— 0.1	17	4,762	w.	30	s.	26	9	5	14	6.5	13.9
Elkins	1,940	41	51	.....	.....	.....	24.4	.....	60	21	35	—21	10	14	32	....	....	....	4.01	.....	18	3,844	w.	....	.....	...	5	6	17	7.1	19.7
Lower Lake Region.							21.2	— 5.3									75	1.92	— 0.8									7.0	
Buffalo	768	178	206	29.16	30.04	— .03	21.1	— 3.4	49	28	36	— 8	10	16	26	19	14	75	1.62	— 1.2	16	10,919	sw.	60	sw.	28	0	12	16	7.8	5.7
Oswego	335	76	87	29.63	30.03	— .05	21.2	— 3.4	46	28	27	— 6	12	15	29	19	16	89	2.74	+ 0.2	18	7,925	s.	43	se.	26	4	7	17	7.3	22.3
Rochester	523	81	90	29.43	30.03	— .05	22.4	— 2.0	52	28	29	— 7	11	16	29	19	14	73	2.38	— 0.4	16	6,536	sw.	36	w.	9	7	3	18	7.0	16.3
Erie	714	92	102	29.26	30.08	+ .01	21.0	— 6.5	52	20	27	—12	10	15	27	19	15	81	1.44	— 2.0	15	7,628	w.	52	s.	26	2	9	17	7.2	4.7
Cleveland	762	190	201	29.21	30.08	— .01	21.2	— 6.8	58	26	27	—16	10	15	34	18	12	68	1.54	— 1.3	13	10,503	sw.	48	sw.	28	4	10	14	6.9	2.4
Sandusky	629	62	74	29.36	30.00	.00	21.6	— 7.3	61	26	28	—15	10	15	26	18	14	73	1.62	— 1.3	9	5,750	sw.	29	sw.	28	4	8	16	7.2	1.5
Toledo	608	123	127	29.36	30.08	.00	21.4	— 6.8	60	26	29	—15	9	14	28	18	13	73	1.91	— 0.2	8	7,368	sw.	36	s.	28	7	13	8	6.1	0.5
Detroit	730	160	166	29.24	30.08	+ .01	19.8	— 6.4	55	26	26	—13	10	13	23	17	13	77	2.12	— 0.2	9	7,411	sw.	46	s.	26	3	9	16	6.8	6.5
Upper Lake Region.							12.8	— 6.3									83	0.92	— 1.0									5.8	
Alpena	609	61	65	29.32	30.03	— .04	14.2	— 3.8	47	21	23	—30	11	6	26	12	8	78	0.47	— 1.6	7	6,175	w.	37	se.	26	11	5	12	5.5	5.3
Escanaba	612	43	57	29.30	30.03	— .03	9.0	— 6.8	44	19	18	—29	11	0	32	7	5	88	1.03	— 0.6	8	5,465	s.	32	s.	26	10	10	8	5.3	7.4
Grand Haven	628	55	64	29.31	30.04	— .02	17.4	— 7.6	48	26	24	—25	11	11	33	16	14	91	1.13	— 1.1	17	6,720	sw.	36	s.	26	4	5	19	7.6	4.7
Marquette	734	67	95	29.13	29.99	— .07	10.1	— 7.0	43	17	17	—31	10	3	23	8	7	91	0.53	— 1.2	13	6,007	w.	39	sw.	16	9	8	11	6.0	5.8
Port Huron	639	70	108	29.33	30.08	+ .01	19.0	— 4.0	58	26	27	—15	11	11	29	16	14	86	0.95	— 1.5	7	7,796	s.	37	sw.	27	5	17	6	5.8	0.6
Sault Ste. Marie	634	58	65	29.25	29.99	— .07	8.2	— 4.3	43	16	18	—37	10	— 2	37	6	4	87	1.10	— 0.2	8	5,098	w.	38	se.	26	9	9	10	5.9	10.0
Chicago	824	241	274	29.15	30.09	+ .01	17.9	— 8.9	49	17	26	—21	9	10	25	16	12	80	1.60	— 0.7	8	12,163	w.	48	se.	26	9	8	11	6.0	3.5
Milwaukee	671	106	149	29.30	30.08	.00	16.0	— 6.7	52	20	24	—22	9	8	26	13	7	69	0.75	— 1.1	9	8,154	nw.	40	se.	25	5	9	14	6.3	3.8
Green Bay	617	49	57	29.32	30.05	— .05	10.3	— 5.9	45	20	18	—33	10	2	26	8	5	81	0.96	— 1.3	8	5,596	sw.	25	n.	28	11	11	6	4.5	8.7
Duluth	702	95	106	29.22	30.05	— .04	6.3	— 8.2	50	19	15	—36	9	— 2	33	4	—1	75	0.66	— 0.4	3	7,190	nw.	36	nw.	8	11	7	10	5.1	7.2
North Dakota.							1.3	— 5.9									77	0.29	— 0.3									4.3	
Moorhead	905	54	60	29.02	30.14	— .01	3.3	— 1.2	50	19	12	—36	8	— 6	29	1	—1	86	0.60	— 0.2	12	7,430	nw.	38	se.	24	13	4	11	4.6	6.1
Bismarck	1,674	16	29	28.25	30.21	+ .05	1.7	— 7.8	52	15	12	—37	8	— 9	38	—1	—7	69	0.18	— 0.4	6	7,452	nw.	36	nw.	22	14	10	4	4.2	1.8
Williston	1,872	15	31	28.02	30.22	+ .06	— 1.0	— 8.7	43	18	8	—41	8	—10	44	—8	—7	75	0.10	— 0.3	3	7,202	nw.	36	w.	15	15	11	2	4.1	1.0
Upper Miss. Valley.							16.4	— 9.7									76	1.66	— 0.2									6.3	
Minneapolis	.....	99	....	.....	.....	.....	7.8	— 8.4	51	19	16	—33	9	0	25	....	....	....	0.85	— 0.2	8	7,788	nw.	34	nw.	23	10	7	11	....	15.0

TABLE I.—*Climatological data for Weather Bureau Stations, February*, 1899—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Elevation of instruments: Thermometers above ground.	Elevation of instruments: Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. and 8 p. m. + 2.	Pressure, in inches: Mean reduced.	Pressure, in inches: Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. and min. + 2.	Temperature: Departure from normal.	Temperature: Maximum.	Temperature: Date.	Temperature: Mean maximum.	Temperature: Minimum.	Temperature: Date.	Temperature: Mean minimum.	Temperature: Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Precipitation: Departure from normal.	Precipitation: Days with .01, or more.	Wind: Total movement, miles.	Wind: Prevailing direction.	Wind: Maximum velocity: Miles per hour.	Wind: Maximum velocity: Direction.	Wind: Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Up. Miss. Val.—Con.																															
St. Paul	837	114	124	29.11	30.10	— .02	7.6	— 8.2	50	19	15	—33	9	0	28	6	2	79	0.95	— 0.0	10	5,843	nw.	29	nw.	26	12	8	8	4.7	9.2
La Crosse	720	70	78	.....	.....	.....	9 4	—10.7	48	21	18	—32	9	1	32	....	....	....	1.20	+ 0.1	7	4,345	sw.	25	n.	28	6	13	9	5.9	14.3
Davenport	599	71	79	29.40	30.10	.00	16.4	— 8.9	53	16	25	—23	9	7	29	14	10	78	1.91	+ 0.3	9	5,804	nw.	30	nw.	26	6	7	15	6.3	5.3
Des Moines	867	84	88	29.15	30.16	+ .04	15.6	— 7.5	58	19	26	—24	11	6	42	13	9	81	0.57	— 0.7	4	5,986	nw.	29	nw.	23	9	13	6	5.0	5.8
Dubuque	698	101	109	29.29	30.11	+ .02	13.8	— 8.8	51	20	22	—26	9	5	32	11	8	83	0.67	— 0.8	6	5,483	nw.	29	nw.	28	14	8	6	4.2	6.1
Keokuk	614	64	78	29.43	30.14	+ .04	19.6	— 8.7	60	20	28	—21	9	11	30	16	10	70	1.65	— 0.1	7	6,201	nw.	35	nw.	8	10	11	7	4.8	2.2
Cairo	359	87	93	29.73	30.15	+ .05	27.0	—12.4	68	20	35	—14	13	19	29	23	17	70	2.51	— 1.4	9	7,473	n.	38	sw.	26	5	11	12	6.2	6.1
Springfield, Ill.	644	82	92	29.38	30.12	+ .01	19.0	—11.3	56	20	26	—21	9	12	24	16	12	74	2.52	— 0.9	7	7,171	nw.	30	sw.	26	7	7	14	6.0	2.4
Hannibal	534	75	107	.....	.....	.....	19.6	—10.9	59	20	28	—20	12	11	29	....	....	....	2.05	+ 0.4	10	7,086	sw.	32	sw.	19	9	14	5	4.8	4.6
St. Louis	567	111	210	29.48	30.14	+ .03	24.1	—11.0	66	20	32	—16	12	16	26	20	16	74	3.40	+ 0.6	8	7,798	w.	41	w.	23	13	5	10	5.1	6.4
Missouri Valley.							14.5	— 9.8										72	0.91	— 0.4										5.0	
Columbia	.....	4	84	.....	.....	.....	19.8	—13.0	59	20	30	—26	12	10	38	....	....	....	2.19	— 0.4	9	6,439	nw.	30	w.	23	7	13	8	5.8	6.9
Kansas City	963	78	95	29.07	30.18	+ .06	19.4	—11.6	63	19	28	—22	12	10	37	16	12	75	1.54	— 0.3	9	6,377	nw.	32	nw.	23	11	10	7	5.0	4.6
Springfield, Mo.	1,324	100	103	28.64	30.13	+ .03	23.0	—11.7	66	20	32	—29	12	14	34	20	14	72	1.13	— 2.4	5	8,161	n.	39	se.	25	14	6	8	4.9	2.5
Topeka	.....	81	....	.....	.....	.....	18.9	—12.4	64	19	29	—25	12	9	37	....	....	....	1.22	— 0.4	10	.....	n.	....	.....	...	9	13	6	5.1	6.3
Lincoln	1,199	74	84	28.80	30.19	+ .04	14.0	— 9.4	64	19	25	—26	11	4	50	11	6	75	0.56	— 0.4	5	7,922	n.	42	n.	22	15	9	4	4.1	6.8
Omaha	1,108	92	97	28.91	30.18	+ .04	14.7	—10.3	62	19	25	—26	11	5	45	11	6	71	0.71	— 0.1	6	5,608	nw.	28	se.	24	9	13	6	4.8	7.1
Sioux City	1,139	96	164	.....	.....	.....	11.0	— 8.0	61	19	20	—31	11	2	46	....	....	....	0.52	— 0.1	4	8,922	nw.	48	nw.	22	8	12	8	5.3	6.2
Pierre	1,572	50	62	28.39	30.22	+ .05	7.2	— 8.2	61	19	17	—39	12	— 3	50	4	—3	63	0.58	+ 0.2	10	7,672	nw.	48	nw.	19	8	12	8	5.5	5.8
Huron	1,306	56	67	28.65	30.19	+ .02	6.5	— 5.5	60	19	18	—37	9	— 5	54	3	—1	79	0.33	— 0.2	9	8,372	nw.	40	nw.	22	14	11	3	4.0	3.0
Yankton	1,234	52	58	.....	.....	.....	10.8	— 8.4	65	19	22	—30	11	0	48	....	....	...	0.36	— 0.4	6	7,043	nw.	33	sw.	15	8	16	4	5.2	4.7
Northern Slope.							9.6	—12.2										77	0.70	+ 0.1										5.8	
Havre	2,494	46	47	27.34	30.20	+ .04	2.5	—10.7	50	18	11	—43	11	—6	63	2	0	86	1.03	+ 0.5	15	8,071	sw.	52	sw.	15	5	13	10	6.8	10.3
Miles City	2,372	41	49	27.50	30.23	+ .07	4.2	—12.0	49	19	14	—49	11	—5	48	—4	1	92	0.36	— 0.2	10	4,740	w.	36	nw.	21	6	14	8	5.8	3.6
Helena	4,108	88	93	25.78	30.28	+ .13	9.8	—11.9	51	18	19	—30	4	1	37	8	2	68	0.54	— 0.2	6	5,893	sw.	44	sw.	18	2	12	14	6.8	10.7
Rapid City	3,251	46	50	26.55	30.18	+ .02	9.3	—11.3	56	19	20	—34	11	—1	48	7	3	81	0.41	— 0.2	10	5,102	nw.	32	nw.	27	7	12	9	5.8	2.0
Cheyenne	6,084	58	60	23.79	30.28	+ .13	12.4	—14.9	47	19	24	—28	6	1	55	10	3	67	1.63	+ 1.2	10	8,843	nw.	58	w.	27	4	16	8	6.2	16.3
Lander	5,372	28	36	24.48	30.23	+ .08	9.2	—12.6	55	19	24	—35	4	—6	45	6	2	75	0.57	— 0.0	5	2,595	sw.	28	nw.	27	8	14	6	5.2	5.7
North Platte	2,826	43	52	27.05	30.23	+ .00	13.1	—12.2	60	19	25	—35	12	1	47	9	3	70	0.36	— 0.1	5	6,345	nw.	34	n.	22	15	8	5	4.6	5.8
Middle Slope.							20.3	—12.1										72	0.46	— 0.3										4.4	
Denver	5,290	79	151	24.56	30.24	+ .10	17.6	—14.6	56	19	31	—22	6	4	50	12	5	64	0.58	+ 0.1	9	5,989	ne.	42	nw.	19	14	7	7	4.4	9.1
Pueblo	4,682	74	81	25.16	30.16	+ .08	18.6	—11.5	60	20	32	—27	12	5	50	14	8	72	0.42	— 0.0	7	4,238	se.	46	w.	20	10	13	5	4.8	4.9
Concordia	1,398	42	47	28.60	30.21	+ .06	16.8	—11.4	68	19	27	—25	12	7	51	14	11	83	0.91	— 0.0	8	5,046	s.	25	nw.	22	14	8	6	4.9	9.0
Dodge	2,504	44	52	27.39	30.18	+ .08	20.0	—11.8	67	19	32	—26	12	8	48	15	8	68	0.30	— 0.4	7	7,030	nw.	39	se.	24	14	11	3	4.2	2.5
Wichita	1,351	78	85	28.65	30.18	+ .09	21.2	—10.6	67	19	31	—22	12	11	41	17	12	74	0.30	— 1.0	5	6,415	n.	34	n.	22	15	6	7	4.4	0.7
Oklahoma	1,218	54	62	28.77	30.15	+ .07	27.4	—12.7	70	20	39	—17	12	16	41	23	17	70	0.48	— 0.6	3	7,519	n.	43	n.	22	18	1	9	3.8	1.6
Southern Slope.							31.8	— 8.9										65	0.04	— 1.3										3.9	
Abilene	1,749	45	54	28.20	30.12	+ .02	36.7	— 9.2	78	20	50	— 6	12	24	44	29	18	55	0.01	— 1.4	1	7,536	sw.	46	sw.	25	10	11	7	4.5	0.1
Amarillo	3,691	54	61	26.17	30.13	+ .04	27.0	— 8.6	65	27	41	—16	12	13	55	22	17	75	0.07	— 1.2	3	10,237	n.	50	n.	22	18	5	5	3.3	0.7
Southern Plateau.							46.4	— 1.1										36	0.17	— 0.5										2.2	
El Paso	3,767	10	110	26.11	30.01	— .03	46.3	— 3.1	76	22	61	5	12	31	44	33	11	31	0.03	— 0.4	1	10,468	nw.	58	sw.	25	22	4	2	2.0	T.
Santa Fe	6,998	47	50	23.08	30.04	— .02	28.2	— 3.8	53	28	39	— 5	7	17	31	22	12	56	0.73	— 0.1	9	5,026	ne.	36	sw.	2	17	8	3	3.1	7.4
Flagstaff	6,885	12	25	23.24	30.12	.....	28.8	.....	54	21	42	—21	6	16	38	26	....	....	2.58	.....	6	.....	sw.	....	.....	...	16	3	9	3.2	25.8
Phenix	1,076	47	57	28.83	29.98	— .07	53.0	— 1.3	79	22	67	24	7	39	36	41	26	40	0.10	— 0.8	2	3,259	e.	26	w.	24	17	8	3	3.1	
Yuma	139	16	50	29.82	29.97	— .05	57.8	— 1.0	85	22	72	28	7	43	39	44	25	31	0.01	— 0.5	1	5,107	ne.	48	w.	24	23	5	0	0.9	
Independence	3,907	10	58	25.98	29.99	— .09	46.5	+ 3.7	75	19	59	11	6	34	34	35	11	24	T.	— 0.6	0	7,279	nw.	54	nw.	1	25	2	1	1.2	T.
Middle Plateau.							33.3	— 0.6										64	1.18	0.0										5.2	
Carson City	4,720	82	92	25.31	30.17	+ .07	37.6	+ 1.3	68	19	51	— 4	6	24	48	31	21	55	0.36	— 1.2	4	4,801	n.	58	sw.	1	14	9	5	3.9	3.5
Winnemucca	4,340	59	70	25.67	30.17	+ .04	32.7	+ 0.2	58	19	43	—12	6	23	33	30	25	74	0.29	— 0.6	8	7,661	sw.	51	sw.	28	9	6	13	6.1	2.0
Salt Lake City	4,344	83	90	25.62	30.19	+ .01	29.6	— 3.3	51	19	37	—10	6	22	23	26	18	64	2.98	+ 1.7	14	3,343	se.	30	nw.	27	10	8	10	5.5	29.0
Grand Junction	4,608	43	50	25.30	30.14	.....	28.0	.....	60	28	40	—12	6	16	31	23	14	63	0.45	.....	3	3,377	nw.	39	s.	1	7	16	5	5.2	6.7
Northern Plateau.							24.7	— 4.0										75	1.71	0.0										6.5	
Baker City	3,470	49	55	26.46	30.21	+ .08	23.8	— 1.2	49	19	32	—20	4	16	27	20	14	69	1.96	+ 0.2	13	3,279	nw.	25	s.	28	5	10	13	6.5	23.3
Boise	2,736	61	68	27.34	30.21	+ .04	28.4	— 6.3	53	19	36	— 9	4	20	23	26	20	72	1.91	+ 0.3	10	2,786	w.	28	nw.	27	8	11	9	5.7	13.2
Idaho Falls	4,742	10	56	25.28	30.34	+ .15	15.2	— 4.8	41	19	24	—29	5	6	36	14	11	82	0.53	— 1.3	9	6,459	n.	50	sw.	27	2	4	22	7.9	5.5
Spokane	1,943	99	107	28.00	30.16	+ .05	24.7	— 3.8	50	19	31	—12	4	19	22	22	18	76	1.39	— 0.6	11	5,223	sw.	34	sw.	27	8	10	10	6.0	8.6
Walla Walla	1,018	65	73	29.06	30.21	+ .10	31.4	— 4.0	59	18	37	— 6	5	26	26	28	24	78	2.75	+ 1.4	13	4,693	s.	32	sw.	20	5	14	9	6.2	20.1
N. Pac. Coast Reg.							39.2	— 1.5										85	7.98	+ 1.8										8.0	
Fort Canby	179	10	34	29.97	30.17	+ .15	39.8	— 1.9	49	*	43	16	3	36	14	39	37	89	11.83	+ 5.5	24	11,220	e.	54	se.	14	1	3	24	9.0	1.5
Neah	50	7	24	30.04	30.10	+ .07	38.4	— 2.6	50	14	42	17	3	35	17	38	36	90	16.22	+ 6.0	26	8,081	w.	44	w.	27	2	2	24	8.9	15.0
Port Crescent	236	15	20	.....	.....	.....	36.8	— 1.0	51	15	42	10	4	31	21	....	....	....	5.12	+ 0.4	22	3,589	w.	36	se.	26	0	12	16	7.8	10.0
Seattle	11v	114	121	30.00	30.13	+ .07	39.0	— 0.9	55	14	43	12	3	35	16	37	34	81	3.20	— 1.4	16	4,922	s.	30	sw.	26	3	6	19	7.5	6.1
Tacoma	213	113	130	.....	.....	.....	38.0	— 0.9	55	18	43	9	4	33	21	....	....	....	4.50	— 0.8	17	6,011	sw.	33	sw.	9	3	3	22	8.1	7.5
Astoria	.....	18	....	.....	.....	.....	40.2	— 2.8	52	*	45	15	3	36	15	....	....	....	12.52	+ 4.8	23	.....	e.	....	.....	...	1	5	22	....	8.2
Portland, Oreg	153	208	213	30.03	30.20	+ .12	39.3	— 1.9	59	18	45	9	4	34	19	37	33	79	4.20	— 1.9	16	7,692	s.	40	s.	26	3	7	18	7.3	5.8
Roseburg	521	56	67	29.64	30.22	+ .12	42.0	— 0.1	61	18	48	7	4	36	21	40	38	84	6.27	+ 1.4	20	2,327	sw.	20	sw.	1	2	13	13	7.1	8.5
Mid. Pac. C'st Reg.							49.2	0.0										65	1.14	— 3.0										4.1	
Eureka	64	60	69	30.19	30.25	+ .16	44.4	— 1.8	55	14	49	34	4	40	19	43	40	85	5.03	— 1.1	16	4,435	nw.	36	nw.	20	5	12	11	6.2	T.
Mount Tamalpais	2,375	11	18	27.65	30.16	.....	47.6	.....	71	19	53	23	4	42	24	39	29	56	0.28	.....	4	15,608	nw.	84	nw.	26	14	13	1	3.4	T.
Red Bluff	334	54	58	29.79	30.15	+ .06	51.6	+ 2.6	79	18	62	26	4	41	30	42	31	50	0.01	— 3.7	1	5,788	n.	34	se.	28	19	8	1	3.0	
Sacramento	71	106	117	30.06	30.14	+ .05	51.5	+ 1.7	80	18	62	30	6	41	34	44	33	53	0.04	— 3.1	1	6,845	nw	31	n.	20	19	8	1	3.2	T.
San Francisco	153	161	167	30.00	30.17	+ .09	51.6	— 0.1	80	18	58	34	4	45	25	48	45	82	0.10	— 3.6	2	5,860	w.	39	w.	25	11	10	7	4.6	T.
Point Reyes Light	.....	12	....	.....	.....	.....	46.7	— 2.6	68	22	51	33	5	43	23	....	....	....	0.53	— 3.3	5	17,751	nw.	75	nw.	24	15	7	6	4.1	
S. Pac. Coast Reg.							53.2	— 0.2										61	0.16	— 2.5										2.4	
Fresno	332	67	70	29.76	30.12	+ .04	51.2	+ 1.0	76	19	64	24	6	39	34	43	34	56	0.02	— 1.2	1	2,480	nw.	20	nw.	23	25	3	0	1.8	
Los Angeles	330	74	82	29.68	30.04	— .01	53.7	— 0.7	82	19	66	33	4	42	36	46	40	68	0.04	— 3.2	3	3,007	w.	20	sw.	2	14	12	2	2.9	
San Diego	87	94	102	29.94	30.04	— .02	53.4	— 1.4	76	18	60	34	6	47	27	47	41	67	0.30	— 2.0	3	4,089	nw.	28	nw.	24	22	2	4	2.5	
San Luis Obispo	201	10	46	29.91	30.13	+ .06	54.4	+ 0.1	86	19	68	25	6	41	36	45	36	54	0.28	— 3.5	2	4,019	n.	22	n.	5	21	6	1	2.5	
West Indies.																															
Basseterre	29	41	54	30.06	30.09	.....	75.7	.....	82	14	80	66	16	71	14	68	65	71	1.21	.....	19	7,548	e.	33	e.	25	4	15	9	5.9	
Bridgetown	30	57	65	29.99	30.02	.....	76.4	.....	84	28	82	69	16	71	14	71	68	79	2.15	.....	19	6,628	e.	27	e.	15	1	17	10	6.6	
Colon	25	....	....	29.85	29.88	.....	79.1	.....	86	22	83	72	12	75	13	75	73	85	6.56	....	15	4,931	ne.	24	nw.	16	2	16	10	6.3	
Havana	57	83	91	30.00	30.06	.....	73.2	.....	87	26	80	53	9	65	23	67	65	85	2.79	.....	8	6,009	se.	37	nw.	8	12	10	6	5.0	
Kingston	286	38	52	29.71	30.01	.....	75.6	.....	89	16	85	63	4	66	22	68	66	80	0.26	.....	7	5,037	ne.	31	se.	22	10	11	7	5.3	
Port of Spain	40	65	66	29.93	29.97	.....	77.2	.....	87	14	85	66	25	69	20	70	68	75	0.93	.....	12	3,258	e.	30	e.	16	6	19	3	5.5	
Roseau	25	38	46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
San Juan	82	109	117	30.00	30.08	.....	75.2	0.0	85	8	81	66	28	69	16	70	68	80	0.80	— 1.6	14	4,747	e.	20	e.	4	19	9	0	3.2	
Santiago de Cuba	82	45	51	29.93	30.01	.....	76.0	.....	87	18	85	62	14	67	22	68	65	76	0.90	.....	5	3,431	s.	23	n.	14	19	7	2	3.1	
Santo Domingo	59	82	88	30.03	30.09	.....	74.6	.....	85	3	82	60	11	65	20	69	67	81	0.90	.....	9	3,071	n.	14	se.	7	11	16	1	3.9	
Willemstad	75	39	46	29.89	29.96	.....	77.4	.....	84	2	82	68	27	73	14	71	69	76	1.60	.....	14	9,499	e.	28	e.	14	15	13	0	3.6	
Alaska.																															
Sitka	90	4	22	29.66	29.76	.....	52.9	.....	44	13	38	6	20	28	23	30	28	87	10.38	.....	21	4,245	e.	33	w.	19	0	4	24	9.1	23.6

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. *Two or more dates. †Received too late to be considered in departures, etc.

TABLE II.—*Climatological record of voluntary and other cooperating observers, February*, 1899.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alco	80	— 3	46.8	4.20	3.0
Ashville	72	—12	37.2	6.27	5.0
Bermuda	77	— 4	40.8	4.69	8.9
Birmingham	74	—10	40.0	4.48	.....
Bridgeport	.....	.....	.....	8.89	3.5
Citronelle	75	— 2	46.6	4.59	5.0
Clanton	73	— 9	41.6	9.39	.....
Daphne	74	0	48.8	1.58	0.3
Decatur	72	—12	35.3	6.64	2.0
Demopolis	.....	.....	.....	7.47	.....
Elba	76	— 7	47.7	7.97	T.
Eufaula[a]	79	— 4	44.8	6.29	3.0
Eufaula[c]	.....	.....	.....	6.61	3.5
Evergreen	76	0	41.8	3.60	7.5
Florence[a]	.....	.....	.....	6.45	3.5
Florence[b]	78	—11	33.9	6.18	5.0
Fort Deposit	76	— 6	42.6	5.00	6.0
Gadsden	74	—13	37.3	6.23	3.6
Greensboro	75	— 5	39.4	6.17	4.5
Hamilton	72	—16	35.3	8.73	5.5
Healing Springs	80	— 7	41.5	4.91	3.3
Highland Home	74	— 4	44.7	4.98	5.5
Jasper	.....	.....	.....	6.08	5.5
Lock No. 4	72	— 9	37.0	7.21	2.7
Maplegrove	74	— 9	37.0	7.10	4.0
Marion	73	— 1	41.4	8.95	4.0
Mount Willing	67	— 5	41.9	7.58	.....
Newbern	76	— 8	38.8	6.91	7.5
Newburg	72	— 9	33.6	5.87	5.9
Newton	76	— 5	45.2	8.40	5.0
Oneonta	71	—15	36.0	7.19	4.0
Opelika	70	— 7	40.0	6.42	4.5
Oxanna	70	—10	40.8	6.42	4.0
Pineapple	78	— 4	38.8	2.47	4.2
Pushmataha	.....	— 7	.....	6.94	6.5
Riverton	75°	— 8°	30.1°	6.93	3.0
Rockmills	74	—10	43.0	7.10	4.0
Scottsboro	69	—13	34.6	7.79	2.0
Selma	77	— 5	41.2	5.41	3.2
Sturdevant	.....	.....	.....	3.45	3.0
Talladega	75	—10	41.4	6.20	4.0
Tallassee	.....	.....	.....	7.12	3.0
Thomasville	70	— 5	40.0	2.71	5.7
Tuscaloosa	74	— 7	37.0	3.96	3.5
Union	75	— 9	42.8	4.25	5.5
Union Springs	75	— 6	43.0	6.05	6.0
Uniontown	75	— 6	38.2	8.58	2.0
Valleyhead	70	—17	35.8	7.91	3.0
Warrior	.....	.....	.....	9.34	.....
Wetumpka	75	— 7	41.7	6.15	3.0
Wilson[*1]	79	— 3	47.1	5.31	6.1
Wilsonville	.....	.....	.....	5.45	3.5
Arizona.					
Allaire Ranch	.....	.....	.....	0.24	2.5
Arizona Canal Co. Dam	80	25	52.8	.....	
Aztec[*1]	87	24	53.1	0.00	
Benson	.....	.....	.....	0.05	0.5
Bisbee	69	17	46.5	0.51	5.0
Blaisdell[*5]	87	28	61.4	0.00	
Bowie	.....	.....	.....	0.30	2.0
Buckeye	85	18	53.4	0.00	
Calabasas	72	10	43.2	0.38	3.0
Casa Grande[*1]	86	34	57.0	0.30	
Chample Camp	66	22	55.0	0.30	
Cochise[*1]	57	15	39.2	0.21	2.0
Congress	72	30	50.9	0.20	T.
Dragoon	.....	.....	.....	0.00	
Dragoon Summit	.....	.....	.....	0.13	1.0
Dudleyville	78	18	48.2	0.57	0.5
Fort Apache	65	—15	38.2	1.04	10.5
Fort Defiance	52	—24	24.5	2.30	22.0
Fort Grant	84	14	48.4	0.35	1.0
Fort Huachuca	70	14	44.0	0.43	
Fort Mohave	89	27	55.6	0.04	
Gilabend[*1]	78	24	52.3	0.20	
Holbrook	66	— 6	34.4	0.17	1.5
Hot Springs	77	23	52.0	0.20	T.
Ingleside	80	22	52.4	0.15	
Jerome	69	12	43.6	1.00	9.0
Lochiel[*1]	69	14	43.1	0.36	2.0
Maricopa[*1]	84	30	56.4	0.26	
Mesa	79	24	50.6	0.34	
Mount Huachuca	67	11	43.9	0.91	3.0
Music Mountain	76	10	45.8	0.02	0.5
Natural Bridge	.....	.....	.....	0.85	4.0
Oracle	69	10	44.9	1.85	5.0
Oro	.....	.....	.....	0.18	
Oro Blanco	73	20	48.3	0.52	0.8
Pantano[*1]	76	18	50.1	0.75	5.0
Parker	90	16	56.0	T.	T.
Peoria	76	26	52.4	0.10	
Phenix	84	19	52.9	0.11	
Pima	78	17	45.5	0.47	0.8
Pinal Ranch	.....	.....	.....	2.24	9.0
Prescott	70	—12	38.8	0.66	5.0
San Carlos	80	9	46.7	0.00	
San Simon[*1]	72	10	43.9	0.30	3.0
Sentinel	83	27	54.8	0.00	
Signal	84	18	51.8	0.07	
Snowflake	64	— 8	34.6	0.11	1.7
Strawberry	61	2	31.8	1.45	11.0
Texas Hill[*1]	86	22	56.4	T.	
Tombstone	71	14	46.7	0.40	.....
Tuba	70	0	40.4	0.02	T.
Tucson	79	17	49.2	0.39	1.2
Vail[*5]	76	19	53.0	1.13	6.0
Walnut Grove	.....	.....	.....	0.00	
White Hills	75	3	49.4	0.00	
Willcox[*1]	80	16	44.7	0.30	
Williams	60	—18	30.9	2.10	21.0
Winslow	70	0	37.2	0.30	3.0
Yarnell	.....	.....	.....	0.20	2.0
Arkansas.					
Amity	69	—12	33.2	1.28	2.5
Arkansas City	.....	.....	.....	2.95	3.5
Beebranch	70	—16	31.6	1.80	3.0
Blanchard Springs	75	—15	37.0	2.30	3.5
Brinkley	67	—12	32.0	4.15	8.0
Camden[a]	.....	.....	.....	2.47	3.0
Camden[b]	70	—10	34.1	1.85	5.2
Canton[*1]	71	—23	27.3	.....	.....
Conway	75	—15	34.1	2.45	3.5
Corning	71	—25	27.0	2.50	5.1
Dallas	68	—15	33.0	1.34	1.2
Dardanelle	.....	.....	.....	1.26	0.0
Elon	73	—14	36.4	3.22	.....
Fayetteville	68	—24	28.2	0.98	1.5
Fulton	.....	.....	.....	1.20	1.0
Hardy	70	—19	28.0	2.65	4.2
Helena[a]	.....	.....	.....	3.21	2.0
Helena[b]	71	— 7	36.0	2.81	T.
Hot Springs[a]	70	—12	34.4	1.45	T.
Hot Springs[b]	.....	.....	.....	1.00	.....
Jonesboro	67	—14	30.0	3.67	5.5
Keesees Ferry	71	—25	26.6	1.96	5.2
Lacrosse	60	—20	24.5	.....	.....
Lonoke	66	—11	33.2	2.04	1.8
Luna Landing[*5]	70°	— 6	35.0°	3.45	.....
Malvern	69	—10	35.2	1.98	.....
Marianna[*1]	67	—10	34.6	.....	.....
Marvell	67	—10	33.8	3.23	2.2
Moore	.....	.....	.....	2.43	4.2
Mossville	65	—22	27.2	2.61	5.6
Mount Nebo	67	—20	29.5	2.30	6.0
New Gascony	70	—10	33.1	3.58	2.5
Newport[a]	.....	.....	.....	2.42	7.0
Newport[b]	68	—14	28.9	1.89	4.0
Newport[c]	71	—19	31.2	1.96	2.3
Oregon[*1]	70	—24	27.2	.....	.....
Osceola	68	—16	30.0	4.43	13.5
Ozark	71	—15	32.3	2.13	3.5
Picayune	73	—10	37.4	1.04	.....
Pinebluff	70	— 5	37.0	2.36	2.0
Pocahontas	67	—22	27.1	1.79	.....
Pond	69	—24	27.5	1.40	1.5
Powell	.....	—24	.....	1.95	4.5
Prescott	71	8	38 8	1.53	2.2
Rison	.....	—11	.....	1.95	1.8
Russellville	71	—15	31.2	1.22	
Silver Springs	72	—24	28.2	1.46	2.5
Spielerville	74	—17	31.4	1.24	2.7
Stamps	69	— 8	35.6	2.53	8.0
Stuttgart	71	—10	33.0	3.10	1.6
Texarkana	.....	6	.....	0.63	3.5
Warren	76	—10	33.2	2.88	6.5
Washington	69	—10	35.0	1.92	1.4
Wiggs[*1]	69	—12	37.1	1.27	0.8
Winslow	64	—25	23.8	1.94	7.0
Witts Springs	66	—24	22.7	2.38	3.0
California.					
Agnew	74	28	49.1	0.37	
Anada	70	2	39.4	2.29	5.0
Arlington Heights	86	28	53.4	0.89	
Azusa	.....	.....	.....	0.84	
Ballast Point L. H	.....	.....	.....	0.28	
Bear Valley	.....	.....	.....	3.20	28.0
Berkeley	80	30	50.8	0.22	
Bishop	76	5	47.2	0.00	
Blue Lakes City	83	26	52.1	0.72	T.
Boca[*1]	58	—30	26.6	.....	.....
Bodie	47	—20	24.8	0.14	2.0
Bowmans Dam[*1]	68	8	36.4	2.54	27.0
Caliente[*1]	70	27	51.3	0.41	
Calloway	82	22	52.8	0.10	
Campbell	80	26	48.7	0.25	
Cape Mendocino L. H	.....	.....	.....	5.05	
Cedarville	58	—12	31.8	1.15	11.0
Centerville[*1]	86	32	53.5	0.49	T.
Chico[*1]	84	25	52.6	0.00	
Chino	.....	.....	.....	0.20	
Cisco[*1]	46	0	29.0	2.60	26.0
Claremont	81	20	50.4	0.40	T.
Corning[*5]	80	25	46.9	0.00	
Coronado	75	42	56.2	.....	
Craftonville	86	27	53.8	0.72	
Crescent City	58	23	44.0	10.95	4.0
Crescent City L. H	.....	.....	.....	9.30	.....
Cuyamaca	62	4	37.1	1.53	16.5
Delano[*1]	78	23	47.7	T.	
Delta[*1]	76	15	46.4	0.00	
Drytown	81	24	53.2	0.25	
Duarte	75	29	50.4	0.00	
Dunnigan[*1]	77	28	52.8	T.	
Durham[*1]	82	24	50.6	0.00	
East Brother L. H	.....	.....	.....	0.15	
Edmanton[*1]	63	3	36.4	3.01	21.0
El Cajon	84	25	52.5	0.55	
Elsinore	88	22	53.2	0.48	
Escondido	79	20	48.1	1.13	
Folsom City[*1]	81	25	50.6	0.07	
Fordyce Dam	.....	.....	.....	3.68	39.0
Fort Bragg	.....	.....	.....	0.62	
Fort Ross	72	29	48.6	0.85	T.
Fort Tejon	.....	.....	.....	0.50	
Georgetown	72	18	44.2	0.61	5.0
Gilroy Hot Springs	.....	.....	.....	0.21	
Glendora	.....	.....	.....	0.10	
Goshen[*5]	75	30	54.4	0.25	
Grand Island[*5]	81	28	52.8	0.00	
Grass Valley	.....	.....	.....	0.47	1.0
Greenville	68	— 9	35.4	0.50	9.0
Hollister	80	20	50.0	0.25	
Humboldt L. H	.....	.....	.....	3.59	
Hydesville	66	20	47.2	4.20	4.0
Indio[*1]	87	30	62.2	0.00	
Iowa Hill[*1]	72	22	46.7	0.83	2.0
Irvine	92	32	58.3	0.55	
Jackson	70	20	47.2	0.57	1.8
Jolon	.....	.....	.....	0.13	
Keene[*1]	65	28	41.9	1.17	4.0
Kennedy Gold Mine	70	18	44.7	0.53	
Kernville	.....	.....	.....	0.40	
King City[*1]	78	26	45.8	0.18	
Kingsburg[*5]	75	23	48.6	0.20	
Kono Tayee	71	25	48.3	T.	
Lagrange[*5]	76	26	51.4	0.35	
Lakeside	.....	.....	.....	0.73	
Lamesa	.....	.....	.....	0.59	
Laporte[*1]	61	4	34.4	2.69	26.9
Las Fuentes Ranch	.....	.....	.....	0.00	
Lemoncove	80	23	53.7	.....	.....
Lemoore[a*1]	73	16	48.6	0.26	
Lick Observatory	61	13	41.0	0.75	4.0
Lime Point L. H	.....	.....	.....	0.15	
Lodi	82	25	50.4	0.16	
Los Alamos	.....	.....	.....	0.44	
Los Gatos[b]	76	29	50.1	0.44	
Malakoff Mine	78	14	46.2	1.01	5.5
Mammoth Tank[*1]	85	29	60.0	0.00	
Manzana	73	24	48.4	T.	T.
Mare Island L. H	.....	.....	.....	0.28	
Merced[*1]	75	26	50.6	.....	
Mills College	.....	.....	.....	0.15	
Milo	.....	.....	.....	0.52	1.5
Milton (near)[*1]	73	25	49.4	0.24	
Modesto[*1]	92	28	54.8	0.21	
Mohave[*1]	72	18	48.3	0.00	
Mokelumne Hill[*3]	.....	23	44.8	0.70	
Monterey[*1]	72	29	53.2	0.66	
Mountain View	.....	.....	.....	0.26	
Mount Frazier	.....	.....	.....	0.40	1.5
Mutah Flat	.....	.....	.....	0.00	
Napa[b]	86	25	52.1	T.	T.
Needles	70	28	57.4	T.	
Nevada City	72	14	42.4	0.49	2.5
Newhall[*1]	85	22	50.5	0.00	
North Ontario	80	22	50.8	0.63	
North San Juan[*1]	84	16	47.3	0.85	3.5
Oakland[a]	82	31	50.7	0.07	
Ogilby[*1]	80	40	53.9	0.00	
Oleta[*1]	70	20	43.9	0.96	1.5
Orland[*1]	82	26	53.2	T.	
Palermo	81	24	49.2	0.00	
Paso Robles[b]	77	20	49.4	0.08	
Peachland[*5]	83	24	51.2	0.19	
Piedras Blancas L. H	.....	.....	.....	0.45	
Pigeon Point L. H	.....	.....	.....	0.55	
Pilot Creek	.....	.....	.....	1.08	11.0
Pine Crest	82	31	56.6	T.	
Placerville	76	22	46.3	0.15	
Point Ano Nuevo L. H	.....	.....	.....	0.50	
Point Arena L. H	.....	.....	.....	1.54	
Point Bonita L. H	.....	.....	.....	0.47	
Point Conception L. H	.....	.....	.....	0.17	
Point Firmin L. H	.....	.....	.....	0.20	
Point George L. H	.....	.....	.....	1.76	
Point Hueneme L. H	.....	.....	.....	0.00	
Point Lobos	74	33	48.2	0.18	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Point Loma L. H				0.08	
Point Montara L. H				0.10	
Point Pinos L. H				0.56	
Point Sur L. H				0.31	
Pomona (near)	84	22	53.2	0.04	
Poway *[3]	87	26	47.6	0.61	
Quincy	61	— 4	34.3	0.82	10.8
Ranch House	82	35	54.9	0.26	
Redding *b*	79	23	50.2	1.04	T.
Redlands	87	28	54.6	0.71	
Represa	76	20	49.4	0.04	
Rio Vista	83	25	53.0	0.00	
Roe Island L. H				0.10	
Rosewood	78	15	45.6	0.30	T.
Sacramento *a*	81	24	51.2	0.06	T.
Salinas *[1]	75	31	52.4	0.50	
Salton *[1]	90	29	57.7	0.00	
San Bernardino	84	25	53.4	0.51	
San Jacinto	82	19	50.6	0.69	
San Leandro *[1]	90	33	54.3	0.20	
San Luis L. H				0.89	
San Mateo *[1]	67	32	49.0	0.37	
San Miguel *[1]	78	19	47.9	0.26	
San Miguel Island	78	38	52.2	0.35	
Santa Barbara *a*	81	29	54.2	0.00	
Santa Barbara L. H				0.00	
Santa Clara *a*				0.27	
Santa Cruz *b*	82	26	50.4	0.45	
Santa Cruz L. H				0.42	
Santa Maria	84	30	54.9	0.46	
Santa Monica *[1]	75	34	51.6	0.05	
Santa Paula *[1]	86	26	53.0	0.00	
Santa Rosa *[1]	80	19	52.2	0.00	
Shasta	80	20	50.4	1.20	
Sierra Madre	78	28	53.6	0.12	
Sneddens Ranch				0.00	
Sonoma				0.34	
S. E. Farallone L. H				0.28	
Stanford University	80	20	48.9	0.25	
Stockton *a*	79	24	50.4	0.18	
Summerdale	62	5	37.2	1.24	14.0
Susanville	59	— 1	36.2	0.31	2.0
Tehama *[1]	82	29	52.8	0.00	
Tejon Ranch	79	29	52.4	0.31	T.
Templeton *[1]	75	25	46.6	0.47	
Thermalito	83	24	50.8	0.00	
Trinidad L. H				4.90	
Truckee *[1]	50	—21	30.0	2.70	27.0
Tulare *b*				0.13	
Tulare *c*	84	18	51.1	0.14	
Ukiah	82	20	47.0	0.43	T.
Upperlake	83	19	48.2	0.25	0.4
Upper Mattole	81	26	49.3	4.24	5.0
Vacaville *a* *[1]	82	27	55.1	0.20	
Ventura	83	22	50.2	0.00	
Visalia *[1]	76	21	46.2	0.41	
Volcano Springs *[1]	89	21	57.9	0.00	
Walnut Creek	83	23	52.1	0.21	
West Palmdale *[1]	76	12	45.8	0.31	3.0
Westpoint				0.78	6.0
West Saticoy				0.00	
Wheatland	79	24	48.7	0.10	
Williams *[1]	82	30	52.4	0.00	
Wilmington *[1]	80	37	59.0	0.11	
Wire Bridge *[5]	80	22	47.8	0.20	T.
Yerba Buena L. H				0.05	
Yreka	61	— 2	37.2	1.95	
Yuba City *[5]	84	28	53.8	0.11	
Colorado.					
Alexander Lakes				2.65	
Antlers	47	—16	25.2	1.60	26.8
Arkins				1.10	17.5
Boulder	55	—14	18.0	0.98	15.2
Boxelder				1.78	28.0
Breckenridge	39	—37	11.3	5.08	76.8
Canyon	67	—17	25.7	0.30	4.3
Castlerock	54	—32	16.5	0.67	11.0
Cedaredge	57	—15	28.1	0.63	9.3
Cheyenne Wells	59	—26	14.9	0.36	3.5
Collbran				1.61	21.2
Colorado Springs	57	—24	16.8	0.15	3.0
Cope	51	—26	13.5	0.33	3.5
Crook	56	—37	13.0	0.38	5.8
Delta	62	— 6	29.0	0.16	2.3
Dumont				1.34	21.0
Durango	53	—18	26.6	0.97	10.5
Fairview	48	—34	18.6	0.67	11.0
Fort Collins	51	—38	10.0	1.04	14.0
Fort Morgan	44	—36	10.2	0.22	4.0
Fox				0.35	7.0
Garnett	43	—19	15.0	0.06	1.2
Georgetown	43	—21	20.2		
Gleneyrie	55	—18	17.6	0.83	12.2
Greeley	48	—45	8.7	0.69	11.0
Gunnison	46	—27	16.4		
Hamps	52	—25	14.8	0.19	4.0
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hoehne	60	—18	23.6	0.11	1.5
Holly				0.33	6.0
Holyoke				0.88	8.4
Holyoke (near)	54	—36	12.4	0.20	4.0
Hugo				0.27	4.5
Husted	57	—33	17.8	0.60	7.2
Lake Moraine	44	—24	15.4	0.62	10.8
Lamar	65	—30	19.6	1.01	16.0
Laporte				1.08	16.5
Las Animas	60	—31	17.0	1.06	10.0
Leadville (near) *[1]	34	—15	16.1	4.00	60.8
Leroy	49	—28	13.0	0.33	5.5
Longs Peak	43	—31	16.0	1.15	16.2
Loveland				0.94	14.0
Mancos	48	—26	24.6	0.68	10.0
Meeker		—37		1.94	21.5
Minneapolis	68	—26	20.2	0.18	2.8
Moraine	39	—32	16.1	2.32	33.2
Pagoda	48	—39	19.1	4.95	52.0
Parachute	59	—17	26.3	1.78	24.0
Perry Park				0.38	5.6
Rangely	52	—30	20.4	0.73	9.8
Rockyford	60	—32	16.7	0.55	6.5
Ruby				5.04	69.0
Saguache	43	—10	16.8	0.69	10.0
Salida	56	—20	26.4	0.15	2.0
San Luis	49	—25	20.5	0.37	3.7
Santa Clara *[1]	52	—15	24.7	1.04	17.8
Seguro				0.35	6.0
Seibert				0.70	7.5
Smoky Hill Mine	49	—26	16.0	1.22	17.0
Springfield				0.19	3.0
Stamford *[1]	50	—18	16.0	1.05	16.5
Strickler Tunnel				1.00	19.0
Trinidad				0.23	4.0
Troutvale	46	—32	12.2	0.70	11.0
T. S. Ranch	56	—11	28.2	0.52	6.5
Vilas				0.13	2.0
Wagon Wheel	46	—22	15.8	0.40	8.0
Walden	40	—39	13.4	1.74	27.0
Wallet				0.18	3.0
Westcliffe	48	—22	20.4	0.69	10.5
Wray	62	—32	15.1	0.07	1.5
Yuma				0.60	9.0
Connecticut.					
Bridgeport	54	— 9	25.0	5.17	31.8
Canton	52	—10	21.4	4.17	23.0
Colchester	56	— 7	24.6	4.62	27.2
Falls Village				4.69	39.0
Greenfield Hill				4.69	23.5
Hartford *a*	52	— 6	24.3	5.29	32.3
Hartford *b*				5.82	32.0
Hawleyville	56	— 9	23.4	5.46	33.0
Lake Konomoc				4.94	
Middletown	55	—13	23.9	6.08	32.5
New London	53	—10	23.3	6.91	35.2
North Grosvenor Dale	58	—16	23.5	5.54	
Norwalk	54	—16	23.2	4.65	23.0
Pomfret	49	— 6	23.7	3.17	18.5
Southington	52	—13	23.2	3.78	19.2
South Manchester				3.37	19.0
Storrs	51	—10	21.9	3.67	22.5
Voluntown	55	—14	24.5	4.60	24.0
Wallingford				6.69	35.0
Waterbury	55	—12	22.6	4.58	29.0
West Cornwall	49	—12	20.4	4.13	37.5
West Simsbury				3.63	23.0
Winsted *[1]	48	— 8	21.7		
Delaware.					
Milford	59	—12	29.9	4.11	36.0
Millsboro	60	—10	28.2	6.90	
Newark	54	—12	24.7	5.85	26.5
Seaford	65	—11	29.9	6.12	30.0
Wyoming	56	—14	26.0	7.77	33.0
District of Columbia.					
Distributing Reservoir *[5]	60	—13	27.0	4.69	
Receiving Reservoir *[5]	58	—14	27.6	4.41	
West Washington	64	—14	26.8	6.16	36.2
Florida.					
Archer	86	10	57.8	3.82	1.5
Bartow	86	22	64.0	7.30	0.5
Boca Raton	83	28	68.4	3.18	
Brooksville	82	18	58.9	8.84	0.2
Clermont	85	20	60.6	7.65	
Crawfordville	81	3	52.8	2.87	
De Funiak Springs	79	0	50.0	6.46	1.5
Earnestville	84	19	60.8	9.71	T.
Estero *[1]	82	22	64.7		
Eustis	85	17	59.9	9.60	0.1
Federal Point	83	13	57.2	4.34	
Fort Meade	87	20	60.0	5.39	
Gainesville	82	6	54.0	4.15	1.0
Grasmere	83	17	58.9	8.89	T.
Haywood				3.65	3.5
Homeland	80	23	59.3		0.8
Huntington	81	13	57.2	4.64	
Florida—Cont'd.	°	°	°	*Ins*	*Ins.*
Inverness	83	14	56.1	6.65	
Jasper	83	5	54.7	3.11	2.0
Kissimmee	86	20	60.2	11.53	
Lake Butler	82	6	56.3	3.81	0.2
Lake City	83	6	55.4	3.42	3.0
Lakemont		24		3.78	
Lemon City	85	29	68.7	2.77	
Liveoak		5		3.01 *[c]*	
Macclenny	84	8	54.8	3.89	1.0
Manatee	86	25	62.9	4.12	
Merritts Island	83	24	62.6	6.32	
Myers	85	28	64.9	8.77	T.
New Smyrna	84	16	58.7	9.10	T.
Ocala	86	12	58.8	5.20	
Orange City	86	16	60.1	9.00	T.
Orlando	85	20	61.3	8.71	
Plant City	86	20	62.8	8.87	
St. Andrews	77	4	50.4	5.09	T.
St. Francis	86	15	59.7	8.77	
St. Francis Barracks	82	13	55.4	7.45	
Sebastian	83	25	64.0	4.70	
Switzerland *[1]	81	12	55.2	4.53	T.
Tallahassee	78	— 2	52.6	4.92	1.0
Tarpon Springs	84	20	60.5	9.79	0.1
Wausau	80	2	50.6	4.18	T.
Georgia.					
Adairsville	66	— 8	35.3	7.83	1.8
Albany	75	— 2	47.6	7.39	2.0
Allentown	80	— 3	48.2	9.32	5.2
Americus	80	— 6	48.4	6.05	4.1
Athens *b*	70			8.56	
Bellville	79	1	46.9	3.90	3.0
Blakely	79	— 1	50.2	5.91	1.0
Canton				7.67	3.5
Cartersville	72	— 6	38.4	7.25	4.0
Cedartown	74	—10	38.8	6.22	3.0
Clayton	70	— 3	37.5	10.10	3.5
Columbus	78	— 3	49.1		
Covington	70	—10	39.6	8.38	
Crescent	76	5	46.9	4.56	4.0
Dahlonega	71	— 11	37.1	8.96	4.0
Diamond	68	—12	34.4	10.32	9.0
Dublin				9.44	4.0
Elberton	73	— 2	41.1	8.83	8.5
Fitzgerald	80	— 1	50.7	5.20	0.5
Fleming	81	5	51.0	5.82	1.0
Fort Gaines	79			7.68	3.5
Franklin	71	— 5	44.4	6.84	4.0
Gainesville	69	— 6	37.4	8.17	5.0
Gillsville	70	— 5	40.6	8.87	
Greenbush	69	—10	35.4	8.94	2.0
Gundee				1.90	3.0
Harrison	80	— 2	46.0	6.35	5.0
Hawkinsville	81	— 3	44.6	7.20	2.0
Hephzibah *[6]	76	8	47.8	7.80	6.0
Jesup	81	1	52.0	6.98	3.0
Lagrange	73	—10	42.8	5.69	0.0
Lumpkin	76	— 5	46.6	6.10	3.5
Marietta	71	— 8	38.8	8.13	2.6
Marshallville	78	— 3	47.9	6.50	4.0
Mauzy	82	1	52.3	7.25	1.1
Millen	80	2	47.6	5.84	7.5
Mount Vernon	78	— 1	47.4	3.20	2.0
Newnan				7.08	3.7
Pelham	79			3.26	0.6
Piscola	80	3	53.6	4.35	3.0
Point Peter	72	— 4	38.6	8.19	5.0
Poulan	79	— 1	49.4	5.42	3.5
Putnam	77	— 3	46.2	5.56	2.1
Quitman	81	2	51.4	5.04	3.0
Ramsey	71	—10	39.2	8.92	3.0
Resaca				9.97	2.1
Reynolds				7.52	4.0
Rome	77	— 7	38.0	8.52	3.5
Talbotton	74	— 6	45.2	9.29	6.0
Tallapoosa	71	—12	37.4	7.44	5.0
Thomasville	80	2	51.9	4.12	2.0
Toccoa	73	— 2	37.6	7.73	4.5
Washington				7.52	5.0
Waycross	85	4	51.6	6.66	3.0
Idaho.					
American Falls	49	—21	24.8		
Atlanta	45	—32	20.1	4.57	57.0
Blackfoot	48	—27	21.6	0.30	3.0
Burnside	40	—32	11.2	0.47	4.5
Challis	51	—22	24.8	0.40	4.0
Downey	42	—35	19.5	0.34	2.1
Fort Sherman	50	—18	23.4	1.74	14.3
Gimlet	48	—35	18.1	0.90	9.0
Gray	42	—36	19.9	0.17	1.7
Kootenai	51	1	26.8	2.00	20.0
Lake	34	—38	5.4	4.70	47.0
Lakeview	50	1	25.7	2.45	16.5
Lewiston	56	— 8	29.2	1.45	14.5
Lost River	44	—41	13.0	0.23	3.6
Marysville	40	—17	20.0	0.72	7.2

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Minidoka	49	−23	24.2	1.15	11.5
Moscow	49	−17	25.4	2.33	23.5
Murray	41	−22	20.9	3.81	47.0
Oakley	51	−17	29.0	0.23	1.0
Ola	52	−26	25.5	2.99	16.2
Paris	50	−35	19.4	0.93	11.2
Payette	56	−15	28.6	1.27	10.0
Pollock	58	−12	30.4	1.13	8.0
St. Maries	48	−15	25.7	3.01	26.8
Soldier	42	−36	19.0	0.82	14.5
Swan Valley	51	−40	18.8	1.49	16.1
Weston	46	−22	24.6	1.38	15.0
Illinois.					
Albion	62	−21	23.4	2.89	11.0
Alexander	62	−27	20.4	2.19	3.5
Ashton	54	−23	16.1	1.66	4.0
Astoria	59	−21	18.7	1.99	2.2
Atwood *a* [*3]	.....	−22	16.1	3.27	1.0
Aurora *a*	54	−22	17.8	1.75	.....
Aurora *b*	53	−21	17.6	2.15	6.1
Bloomington	59	−22	19.7	2.30	2.0
Bushnell	61	−22	18.8	2.07	.....
Cambridge	54	−22	17.0	1.63	6.0
Carlinville	61	−21	21.0	2.30	4.5
Carlyle	.....	.....	.....	3.21	7.0
Carrollton	58	−20	19.9	2.01	3.2
Charleston	58	−22	20.6	2.55	3.2
Chemung	51	−24	14.0	1.62	9.5
Chester	.....	.....	.....	2.76	10.0
Clsne	61	−21	22.8	2.55	14.0
Coatsburg	59	−24	17.6	1.80	.....
Cobden [*3]	62	−19	22.9	3.52	5.0
Danville	.....	.....	.....	2.55	2.0
Decatur	57	−22	19.9	2.43	3.8
Dixon	58	−23	16.3	1.25	2.0
Dwight	51	−22	17.9	2.13	0.5
Effingham	59	−19	22.5	2.47	5.5
Elgin	54	−23	16.1	1.60	6.9
Equality	66	−22	24.8	3.12	13.0
Flora	62	−21	23.0	2.69	8.9
Fort Sheridan	54	−21	16.8	.....	.....
Friendgrove	.....	.....	.....	2.75	10.7
Galva	55	−25	15.6	1.39	2.9
Glenwood [*1]	48	−26	18.5	1.54	2.5
Grafton	.....	.....	.....	2.52	5.0
Grayville	63	−15	26.0	2.91	11.0
Greenville	60	−21	20.6	2.00	2.0
Griggsville	58	−22	19.8	1.54	3.5
Halfway	63	−18	24.2	2.46	6.0
Halliday	63	−19	22.8	2.54	7.5
Havana	61	−21	22.3	2.21	3.0
Henry	53	−22	18.3	1.94	.....
Hillsboro	62	−20	20.4	2.51	4.0
Joliet	50	−20	18.8	1.68	1.8
Kishwaukee	.....	−24	.....	0.95	5.0
Knoxville	55	−26	15.6	1.74	1.9
Lagrange	58	−21	17.3	1.91	4.0
Laharpe	56	−24	17.8	1.38	.....
Lanark	54	−27	14.2	0.20	.....
Loami	.....	.....	.....	2.40	2.4
McLeansboro	61	−19	23.4	2.61	9.2
Martinsville	62	−18	21.6	1.38	5.0
Martinton	52	−20	19.6	0.89	.....
Mascoutah	66	−20	23.2	3.45	8.8
Mattoon	62	−16	23.0	2.00	3.2
Minonk	51	−23	17.9	1.79	1.0
Monmouth	54	−25	16.5	1.49	1.8
Morgan Park	50	−22	19.5	1.78	2.5
Morrisonville	59	−29	19.8	2.42	3.0
Mount Carmel	.....	.....	.....	4.01	14.0
Mount Pulaski	61	−21	19.8	2.13	7.0
Mount Vernon	60	−22	23.4	3.38	16.8
New Burnside	65	−20	25.0	2.63	8.5
Olney	60	−20	23.6	2.81	13.0
Oswego	52	−22	17.9	1.67	0.4
Ottawa	53	−23	18.0	2.10	1.5
Palestine	62	−21	20.6	1.95	10.5
Pana	59	−20	20.8	1.91	3.5
Paris	61	−18	19.2	2.22	.....
Peoria *a*	.....	.....	.....	2.05	2.3
Peoria *b*	57	−22	20.4	1.96	1.7
Philo	60	−21	19.2	2.31	.....
Plumhill	69	−21	22.8	3.32	8.0
Rantoul	59	−22	19.2	1.66	2.9
Raum	65	−16	25.4	2.97	7.5
Riley	51	−24	15.0	1.21	3.8
Robinson	62	−20	22.4	3.12	11.8
Roundgrove	56	−23	16.3	1.87	.....
St. Charles [*1]	50	−24	16.5	2.12	7.2
St. John	.....	.....	.....	3.73	12.2
Savanna	.....	.....	.....	1.20	.....
Scales Mound	50	−27	12.4	1.18	9.2
Streator	52	−24	18.4	1.82	1.2
Sullivan	60	−21	21.8	2.13	3.5
Sycamore	51	−23	15.4	1.59	4.3
Tilden	64	−23	22.0	2.91	11.0
Illinois—Cont'd.					
Tiskilwa	52	−24	16.4	1.81	3.3
Tuscola	60	−21	19.6	1.74	2.5
Walnut	54	−23	18.0	1.57	1.3
Wheaton [*3]	.....	−18	15.8	1.78	5.5
Winchester	53	−22	19.4	2.34	5.5
Winnebago	52	−25	15.2	1.49	6.0
Indiana.					
Anderson	62	−19	21.6	1.95	3.8
Angola	58	−20	18.8	3.17	8.1
Auburn	61	−19	20.2	2.01	T.
Bedford	67	−18	25.4	.....	.....
Bloomington	61	−20	23.8	4.10	13.0
Bluffton	61	−19	21.6	1.99	0.8
Booneville	60	−20	20.2	1.76	7.5
Bright	62	−21	22.2	2.13	9.0
Butlerville	63	−26	23.2	2.31	13.0
Cambridge City	64	−29	21.1	1.96	2.9
Columbia City [*1]	60	−19	19.1	2.64	T.
Columbus	65	−27	23.1	2.66	7.8
Connersville	64	−22	22.1	1.73	3.7
Crawfordsville	60	−19	22.2	3.58	0.7
Delphi	59	−19	19.9	2.02	1.0
Edwardsville [*1]	64	−18	26.6	3.18	6.5
Farmland	62	−19	22.2	2.34	4.9
Fort Wayne	63	−19	21.2	2.35	T.
Franklin [*1]	63	−16	24.2	1.80	5.5
Greensburg	63	−24	21.6	.....	.....
Hammond	51	−22	17.2	0.71	1.0
Hector	61	−22	23.5	2.28	1.5
Huntington	61	−17	21.2	2.31	3.5
Jeffersonville	62	−13	26.0	2.25	9.0
Knightstown	64	−25	22.0	2.88	5.0
Kokomo	61	−17	22.7	1.78	1.5
Lafayette	56	−22	19.4	1.81	1.0
Laporte	49	−21	17.0	1.52	1.0
Logansport *b*	59	−18	20.8	1.16	2.0
Madison	63	−20	25.0	2.69	8.3
Marengo	64	−28	24.0	3.33	13.4
Marion	61	−19	21.0	2.17	1.0
Markle	60	−18	21.4	1.90	1.0
Mauzy	63	−25	21.8	2.18	5.4
Mount Vernon	61	−20	22.4	2.20	8.1
Northfield	60	−20	20.8	2.20	1.5
Paoli	62	−20	24.2	2.72	13.2
Peru	63	−19	23.9	2.19	1.0
Prairie Creek	.....	.....	.....	1.45	7.0
Princeton	62	−20	23.3	3.10	14.0
Richmond	62	−27	21.1	1.52	0.5
Rockville	60	−20	21.2	1.86	2.4
Salem	64	−27	22.8	2.57	14.0
Scottsburg	63	−25	25.2	2.87	13.0
Seymour	62	−20	24.2	3.44	21.0
Shelbyville	61	−20	21.4	2.10	2.0
South Bend	51	−20	19.5	2.18	4.0
Syracuse	53	−21	19.2	2.85	4.8
Terre Haute	60	−16	23.1	2.05	3.9
Topeka	57	−17	19.5	2.27	T.
Valparaiso	50	−20	16.0	0.50	.....
Vevay	60	−22	23.1	4.20	22.0
Vincennes	64	−19	22.6	2.00	9.0
Washington	62	−19	24.3	1.44	4.7
Worthington	64	−24	23.2	2.28	8.7
Indian Territory.					
Healdton	78	−14	31.8	0.22	T.
Kemp	75	−14	34.0	1.05	0.5
Lehigh	72	−15	30.8	1.58	T.
Sapulpa	.....	.....	.....	1.63	0.3
South McAlester	.....	.....	.....	1.76	1.2
Tahlequah	75[1]	−20	32.4	1.55	T.
Tulsa	.....	.....	.....	1.68	.....
Wagoner	.....	−23	.....	1.10	T.
Webbers Falls	.....	.....	.....	1.52	1.0
Iowa.					
Afton	57	−26	14.1	0.50	5.0
Albia	56	−25	17.3	0.35	3.5
Algona [*1]	50	−36	7.2	0.92	9.2
Alta *a*	54	−33	8.8	0.68	6.7
Amana	52	−25	14.0	0.71	5.0
Ames *b*	56[1]	−27	18.2[2]	0.30	2.5
Ames (near)	.....	.....	.....	0.55	4.5
Atlantic	61	−26	13.2	0.65	4.0
Audubon	56	−28	12.8	0.40	4.0
Bedford	61	−25	14.8	0.57	4.5
Belknap	58	−23	15.9	1.10	6.0
Belleplaine	53	−32	14.2	0.76	6.6
Bonaparte	58	−23	16.4	1.12	.....
Britt	48	−33	7.3	1.15	11.5
Burlington	58	−24	16.4	1.74	T.
Carroll	54	−31	9.4	0.55	5.5
Cedarfalls	52	−27	11.9	1.50	15.0
Cedar Rapids	52	−25	14.4	0.50	2.8
Centerville	60	−23	17.5	0.40	4.0
Chariton	58	−24	15.0	0.61	2.8
Charles City	47	−31	9.1	1.72	16.0
Clarinda	62	−24	14.4	0.75	5.8
Clear Lake	48	−32	8.8	1.40	14.0
Iowa—Cont'd.					
Clinton	57	−28	15.1	1.45	4.6
College Springs	62	−27	13.4	0.44	5.8
Corning	62	−25	15.5	0.40	4.5
Council Bluffs	66	−24	15.0	0.89	7.0
Cresco	46	−33	6.0	0.98	9.8
Decorah	48	−34	7.6	1.43	18.0
Delaware [*3]	52	−28	11.8	1.11	10.5
Denison	53	−31	10.0	0.40	4.0
Desoto	57	−25	14.8	0.44	4.2
Dows	52	−30	9.8	0.58	4.0
Eldon	58	−24	14.6	0.78	1.8
Eldora	55	−30	10.4	1.00	10.0
Elkader	52	−28	10.7	1.25	12.8
Estherville	42	−38	2.6	1.20	10.6
Fairfield	63	−24	17.0	1.08	.....
Fayette	47	−30	9.2	1.83	14.7
Fonda	58	−30	9.2	.....	.....
Forest City	50	−33	8.2	1.53	14.0
Fort Madison	.....	.....	.....	1.80	6.0
Galva	56	−30	11.2	0.80	.....
Garden Grove	56	−25	15.0	0.27	2.8
Glenwood	63	−25	15.4	0.50	5.0
Grand Meadow [*1]	46	−30	9.2	1.13	11.0
Greene	50	−29	11.0	1.89	20.0
Greenfield	57	−29	13.0	0.85	5.9
Grinnell	50	−25	13.9	0.77	4.2
Grinnell (near)	50	−26	13.6	0.66	5.0
Grundy Center	53	−29	10.6	0.30	3.0
Guthrie Center	56	−26	16.2	0.50	5.0
Hampton	50	−30	9.4	1.09	10.8
Harlan	57	−29	11.9	0.42	4.2
Hawkeye	.....	.....	.....	2.03	30.2
Hedrick [*1]	53	−23	15.9	0.55	3.5
Hopeville	57	−25	14.2	0.59	0.2
Humboldt	54	−31	11.0	0.44	3.4
Independence	49	−29	11.1	0.87	8.8
Indianola	56	−25	15.5	0.51	5.4
Iowa City *a*	55	−36	14.5	1.82	6.0
Iowa Falls	51	−28	10.0	0.93	8.0
Keosauqua	60	−22	17.8	1.39	2.0
Knoxville	56	−23	15.4	0.49	4.5
Lamoni	56	−24	15.0	0.71	6.8
Lansing	51	−31	12.2	1.77	17.7
Larchwood	.....	.....	.....	1.50	15.0
Larrabee	56	−37	7.8	1.13	11.3
Lemars	58	−35	9.6	0.70	7.0
Lenox	58	−29	13.6	0.38	3.6
Logan	57	−27	11.8	0.70	7.0
Maquoketa	53	−26	16.4	0.78	6.2
Marshall [f]	54	−28	16.6	0.26	2.8
Mason City	50	−35	8.0	0.71	7.2
Monticello	53	−25	13.6	0.97	8.5
Mooar	56	−21	16.8	0.45	0.5
Mountayr	58	−26	13.9	0.81	5.0
Mount Pleasant	.....	−22	.....	0.73	.....
Mount Vernon *a* [*1]	54	−30	12.9	.....	.....
Mount Vernon *b*	54	−26	13.0	0.58	5.7
New Hampton	46	−33	8.6	1.60	16.0
Newton	52	−28	13.2	0.75	7.1
North McGregor	.....	.....	.....	1.36	14.5
Northwood	50	−34	8.2	1.27	12.0
Odebolt	58	−29	12.2	0.83	6.8
Ogden	56	−28	13.0	0.38	3.8
Olin	51	−26	14.1	1.47	5.5
Osage	46	−32	8.4	1.66	16.6
Osceola	58	−32	12.9	0.64	5.2
Oskaloosa	54	−25	14.9	0.44	4.4
Ottumwa	57	−23	16.4	0.52	1.8
Ovid	58	−25	15.7	0.75	4.0
Pacific Junction	62[f]	−26[f]	13.2[f]	0.40	4.0
Parnell	55	−25	16.2	0.20	2.0
Pella	50	−25	12.2	0.27	2.8
Plover	54	−33	10.2	0.35	3.5
Primghar	52	−38	10.7	0.70	7.0
Redoak	64	−25	16.1	0.72	.....
Ridgeway	51	−32	11.1	4.32	22.9
Rock Rapids	60	−40	3.1	0.35	3.5
Rockwell City	57	−31	10.9	0.30	4.0
Ruthven	52	−38	7.2	0.80	8.0
Sac City	57	−29	11.8	0.57	5.8
Sibley	56	−40	5.9	0.84	7.5
Sidney	63	−28	16.0	.....	.....
Sigourney	55	−27	14.3	1.03	6.0
Spencer	54	−36	6.8	0.77	7.7
Spirit Lake	52	−39	5.2	1.16	11.6
Storm Lake	56	−30	9.6	0.59	5.8
Stuart	56	−27	13.6	0.40	4.0
Tara	58	−31	12.4	0.40	4.0
Thurman	62[e]	−25[e]	15.8[e]	1.02	8.0
Toledo	51	−26	13.1	0.12	.....
Villisca	57	−27	15.2	0.76	7.1
Vinton [*1]	53	−26	13.4	1.00	6.0
Wapello	64	−22	16.9	1.24	2.8
Washington	57	−26	14.6	1.21	5.5
Washta	.....	.....	.....	0.60	8.8
Waterloo	53	−27	12.0	1.18	10.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Waverly	51	−27	11.6	1.72	17.2
Webster City	55	−27	12.8	0.50	.....
Westbend *f	51	−35	7.4	0.60	6.0
Westbranch	52	−23	14.2	0.20	2.0
Westunion	.....	.....	.....	1.00	10.0
Whitten *1	50f	−29f	9.7f	0.80	8.0
Wilton Junction	56	−24	15.2	1.71	1.0
Winterset	57	−25	15.0	0.60	6.5
Kansas.					
Abilene	65	−29	17.6	0.80	6.5
Achilles	.....	.....	.....	0.45	4.6
Altoona *2	63	−22	19.0	1.25	1.5
Anthony	.....	.....	.....	0.30	0.5
Atchison *a*	63	−25	17.8	1.36	7.2
Atchison *b* *1	62	−21	17.4	.....	.....
Augusta	67	−24	20.4	0.33	1.5
Burlington	63	−27	20.1	0.87	3.6
Campbell	64	−33	16.0	1.27	11.8
Centropolis	.....	.....	.....	0.80	3.0
Chanute	66	−23	22.3	1.68	3.0
Colby	63	−31	15.8	0.29	2.9
Columbus	65	−24	23.2	2.09	2.1
Coolidge	62	−26	19.4	0.70	7.0
Cunningham	71	−24	20.6	0.20	2.0
Delphos	68	−28	18.6	0.36	3.1
Dresden	61	−26	15.7	0.60	6.0
Ellinwood	66	−21	18.6	0.28	2.8
Emporia	64	−22	21.2	0.75	6.0
Englewood	71	−24	22.8	0.10	1.0
Eureka	.....	.....	.....	0.67	....
Eureka Ranch	64	−29	17.0	0.35	3.5
Fallriver	70	−21	24.3	1.05	4.0
Fanning	63	−30	19.0	0.58	1.0
Fort Riley	67	−28	20.2	0.79	2.8
Fort Scott	68	−23	21.4	1.88	3.0
Frankfort	65	−34	16.4	1.55	15.5
Garden City	66	−32	18.8	1.18	10.3
Garfield	.....	.....	.....	0.19	1.8
Gibson	68	−22	16.8	0.10	1.0
Gove *1	64	−24	19.3	0.50	5.0
Grenola	.....	.....	.....	0.50	T.
Hays	66	−22	19.8	0.20	2.0
Horton	61	−25	17.6	0.90	4.0
Hoxie	.....	−30	.....	0.33	3.3
Hutchinson	.....	.....	.....	0.53	3.3
Independence	67	−21	23.8	1.28	0.9
Lawrence	62	−24	18.9	1.54	7.5
Lebanon	.....	.....	.....	0.40	4.0
Lebo	62	−26	18.2	0.91	3.0
McPherson	67	−27	18.4	0.57	5.5
Manhattan *b*	65	−32	17.8	0.86	5.7
Manhattan *c*	65	−35	16.9	0.63	5.0
Marion	69	−29	19.2	0.50	2.0
Meade	.....	.....	.....	T.	T.
Medicine Lodge	73	−30	24.4	0.09	1.0
Minneapolis	65	−29	16.9	0.33	3.3
Morantown	61	−27	20.4	1.76	2.5
Mounthope *1	65	−24	20.0	0.40	2.0
Ness City	62	−23	23.6	0.30	3.0
Newton	67	−25	20.6	0.42	4.0
Oberlin	.....	.....	.....	0.40	4.0
Olathe	63	−29	21.2	1.00	4.0
Osage City	63	−26	18.6	1.02	5.0
Osborne	.....	.....	.....	0.10	0.2
Oswego	.....	.....	.....	1.73	1.0
Ottawa	65	.....	.....	1.30	5.0
Phillipsburg	.....	.....	.....	0.35	3.5
Pittsburg	65	−23	22.6	1.57	T.
Pratt	63	−24	20.7	0.10	1.0
Rome *1	69	−20	23.4	0.28	T.
Russell	65	−28	18.8	0.27	2.0
Salina	66	−27	17.2	0.54	5.0
Sedan	68	−24	23.7	0.62	T.
Seneca	58	−31	15.0	1.16	10.0
Toronto	69	−27	20.6	0.89	1.5
Ulysses	.....	.....	.....	0.45	4.5
Valley Falls	61	−25	17.8	0.92	3.8
Viroqua	68	−9	23.5	0.60	6.0
Wallace	.....	.....	.....	0.30	3.0
Wamego *1	60	−30	17.6	0.67	6.7
Wellington	.....	.....	.....	T.	T.
Winfield	70	−21	22.4	0.42	0.5
Winona	.....	.....	.....	0.15	1.5
Yates Center	63	−28	18.6	0.80	1.5
Kentucky.					
Alpha *3	.....	−19	29.8	6.48	8.0
Ashland	66	−23	25.0	3.10	8.5
Bardstown	63	−25	27.0	3.89	8.5
Blandville	64	−15	24.7	3.57	9.0
Bowling Green *b*	65	−17	27.0	4.14	.....
Burnside	.....	.....	.....	5.65	9.0
Caddo	59	−20	23.2	3.60	14.8
Canton *1	63	−10	30.0	4.83	17.0
Carrollton	68	−20	26.4	2.04	13.2
Catlettsburg	64	−22	24.6	3.89	10.0
Earlington	69	−28	24.9	4.05	10.0
Kentucky—Cont'd.					
Edmonton	64	−24	27.1	6.33	16.5
Ensor	64	−22	25.5	2.75	12.0
Eubank	63	−22	26.8	4.82	6.0
Falmouth	.....	.....	.....	3.22	17.0
Fords Ferry	64	−20	26.8	2.41	8.5
Frankfort	62c	−16c	29.0c	3.20	13.0
Georgetown	61	−26	25.7	.....	.....
Greensburg	66	−29	26.0	4.59	11.5
Henderson	69	−13	27.9	2.84	12.0
Hopkinsville	70	−19	27.7	4.25	6.5
Irvington	64	−25	26.0	2.25	11.0
Leitchfield	64	−26	25.6	3.68	8.5
Loretto	63	−30	24.6	4.16	12.6
Lyndon	63	−23	24.8	2.25	10.0
Marrowbone	66	−30	26.0	5.04	10.0
Maysville	63	−22	23.4	2.77	10.7
Middlesboro	65	−20	29.0	6.69	9.1
Mount Hermon	63	−21	27.2	6.59	6.5
Mount Sterling	58	−22	20.3	5.74	19.0
Owensboro	65	−21	27.4	2.68	10.0
Owenton	60	−19	24.2	4.18	14.8
Paducah *a*	.....	.....	.....	2.83	8.0
Paducah *b*	71	−12	27.8	2.81	11.0
Princeton	67	−30	25.8	.....	.....
Richmond	61	−24	25.6	5.34	11.0
Russellville	71	−22	29.8	5.74	12.0
St. John	63	−25	26.1	3.32	9.9
Scott	60	−20	23.1	2.30	13.2
Shelby City	62	−28	24.6	4.92	11.0
Shelbyville	63	−23	26.0	3.23	12.0
Vanceburg	59	−25	21.7	.....	.....
Williamsburg	68	−19	30.0	8.34	4.6
Louisiana.					
Abbeville	76	5	46.9	2.58	3.0
Alexandria	77	3	42.6	4.30	7.0
Amite	80	1	46.4	4.85	6.0
Bastrop	78	−12	39.6	3.64	7.2
Baton Rouge	77	2	46.4	2.78	3.0
Calhoun	76	−13	36.6	1.47	8.2
Clinton	79	0	45.8	3.38	3.5
Donaldsonville	80	3	46.2	4.15	3.0
Elm Hall	78	5	46.8	4.60	2.0
Emilie	75	2	46.3	4.57	3.0
Farmerville	75	−15	37.6	3.12	12.0
Franklin	76	8	47.0	4.13	2.0
Grand Coteau	79	2	46.8	1.84	1.8
Hammond	80	1	48.5	3.83	3.0
Houma	78	5	49.4	4.15	5.0
Jeanerette	77	3	44.9	2.98	2.0
Jennings	76	3	46.2	2.77	2.0
Lafayette	76	6	44.8	2.75	1.5
Lake Charles	75	3	44.7	4.16	1.0
Lake Providence	.....	.....	.....	2.95	8.1
Lawrence	84	6	49.1	6.55	2.0
Liberty Hill	81	−6	39.1	3.87	9.5
Mansfield	80	−6	38.8	2.17	5.3
Melville	77	5	45.6	2.42	2.2
Minden	77	−16	36.0	2.56	6.0
Monroe	77	−3	37.2	2.83	6.5
New Iberia	76	6	46.6	3.20	3.0
Oakridge	85	−4	39.0	4.63	10.0
Opelousas	77	2	44.2	2.48	1.5
Oxford	80	−11	38.7	2.07	6.5
Paincourtville	80	6	49.0	3.75	2.7
Plain Dealing	75	−14	38.0	2.09	3.0
Plaquemine	79	4	47.7	2.60	1.0
Rayne	77	3	46.2	3.12	2.0
Robeline	81	−6	41.0	4.18	6.5
Ruston	77	−15	38.6	3.68	5.0
Schriever	81	6	48.2	4.45	3.0
Shellbeach	72	7	45.5	3.20	2.0
Southern University	75	4	46.4	3.80	2.5
Sugar Ex Station	77	6	47.4	4.46	3.0
Sugartown	75	5	45.9	3.56	0.9
Venice	80	9	51.2	5.09	0.8
Wallace	79	5	48.7	4.59	2.0
White Sulphur Springs	.....	.....	.....	4.29	7.0
Maine.					
Bar Harbor	52	−6	21.4	4.05	29.0
Belfast *6	47	−5	19.7	2.76	17.0
Calais	44	−6	18.6	3.62	32.0
Cornish *1	51	−5	30.2	3.29	25.5
Cumberland Mills	53	−13	21.8	3.08	20.5
Fairfield	48	−20	16.5	2.73	18.0
Farmington	51	−16	16.0	2.60	22.2
Flagstaff	48	−30	13.0	3.83	38.0
Gardiner	51	−15	19.0	3.10	19.5
Kineo	40	−24	10.8	3.50	35.0
Lewiston	54	−15	19.0	3.06	21.5
Mayfield	48	−14	15.6	4.00	32.5
North Bridgton	56	−20	19.4	3.98	29.0
Orono	52	−16	16.2	2.27	13.5
Petit Menan *1	40	−3	22.6	.....	.....
Winslow	53	−20	18.0	2.45	17.5
Maryland.					
Annapolis	60	−6	28.4	4.97	31.0
Maryland—Cont'd.					
Bachmans Valley	52	−23	21.7	6.10	31.0
Boettcherville	62	−19	26.4	2.07	17.0
Charlotte Hall	.....	.....	.....	5.75	39.5
Chase	64	−25	24.5	6.84	34.0
Chestertown	56	−9	26.8	6.39	34.2
Chewsville	54	−20	23.9	4.30	31.0
Collegepark	59f	−9f	28.2f	8.00	30.0
Cumberland *b*	59	−12	28.2	5.36	28.0
Darlington	56	−12	25.4	4.55	27.0
Deerpark	56	−25	21.3	4.40	20.0
Denton	58	−14	27.3	6.63	30.0
Easton	60	−15	27.2	8.61	50.3
Ellicott City	56	−8	24.1	5.07	34.0
Fallston	54	−14	25.0	6.09	26.8
Frederick	54	−10	26.2	5.35	34.2
Frostburg	67	−22	25.8	4.86	16.2
Grantsville	58	−22	22.2	3.27	19.0
Greatfalls	57	−14	24.8	4.88	35.8
Greenspring Furnace	56	−14	25.0	5.13	30.0
Hagerstown	55	−14	24.6	5.42	34.0
Hancock	61	−18	23.5	2.93	25.0
Jewell	63	−14	27.0	3.94	24.0
Johns Hopkins Hospital	59	−10	26.9	7.16	33.2
Laurel	60	−18	27.1	4.61	20.0
Mount St. Marys Coll.	55	−15	24.3	4.35	26.5
New Market	56	−14	25.7	4.37	31.0
Ocean City	60	−4	30.2	4.51	28.0
Pocomoke City	64	−4	32.0	5.38	16.0
Port Deposit	59	−10	26.5	5.00	34.0
Princess Anne	62	−10	29.0	5.79	23.5
Queenstown	58	−9	26.8	7.28	43.0
Rockhall *b*	58	−14	26.8	5.27	30.5
Sandy Point	.....	.....	.....	5.75	14.5
Sharpsburg	55	−13	25.3	4.35	25.2
Smithsburg *a*	54	−18	25.6	.....	.....
Smithsburg *b*	60	−18	24.2	5.40	34.0
Solomons	60	−5	28.9	4.54	23.0
Sudlersville	61	−7	28.0	.....	.....
Sunnyside	56	−26	21.2	6.36	26 5
Taneytown	57	−16	25.1	5.57	32.8
Van Bibber	58	−12	26.0	.....	.....
Westernport	60	−13	24.6	3.87	21.5
Westminster	59	−16	23.6	4.86	26.5
Woodstock	57	−13	26.0	5.35	25.5
Massachusetts.					
Adams	50	−14	22.2	.....	.....
Amherst	53	−10	22.8	4.25	30.6
Attleboro	.....	.....	.....	4.47	26.0
Bedford	53	−7	24.6	3.82	33.0
Bluehill (summit)	49	−10	22.6	4 09	36.0
Cambridge	57	−7	25.0	5.41	.....
Chestnut Hill	52	−7	24.1	5.08	24.8
Cohasset	.....	.....	.....	4.61	14.0
Concord	51	−15	22.4	3.47	34.9
Dudley [1]	48s	−12	22.5s	5.40	.....
East Templeton *1	50	−12	21.8	4.10	31.5
Fallriver	55	−5	26.0	4.72	27.0
Fiskdale	.....	.....	.....	3.71	31.1
Fitchburg *a* *1	50	−9	22.7	3.59	31.0
Fitchburg *b*	52	−10	22.8	3.19	28.8
Framingham	49	−8	24.3	4.79	.....
Groton	50	−12	21.8	3.86	36.0
Hyannis *1	45	−4	25.7	5.87	37.0
Jefferson	.....	.....	.....	5.15	36.2
Lawrence	51	−14	23.0	2.64	26.6
Leeds	55	−16	21.6	3.80	26.0
Leominster	.....	.....	.....	3.38	33.0
Long Plain	.....	.....	.....	5.64	22.0
Lowell *a*	53	−14	22.6	5.02	.....
Lowell *b*	52	−13	22.5	.....	.....
Ludlow Center	44	−8	19.9	4.65	33.0
Mansfield *1	49	−8	23.4	5.15	35.5
Middleboro	54	−11	24.4	8.81	29.5
Monson	53	−11	22.8	4.11	29.5
New Bedford *a*	45	−8	25.1	5.31	26.5
New Bedford *b*	51	−5	25.2	4.15	19.2
New Salem	49	−12	20.8	3.03	26.6
Pittsfield	53	−12	20.0	3.07	26.5
Plymouth *1	51	−5	25.7	5.32	34.5
Princeton	.....	.....	.....	4.95	38.5
Salem	.....	.....	.....	3.75	37.5
Somerset *1	60	−10	25.9	5.32	31.0
South Clinton	.....	.....	.....	5.18	34.0
Springfield Armory	53	−4	25.0	4.42	31.5
Sterling	.....	.....	.....	5.26	32.9
Taunton *b*	52	−10	23.7	5.49	32.0
Taunton *c*	52	−16	24.1	6.09	.....
Turners Falls	49	−12	20.5	4.00	27.5
Webster	.....	.....	.....	4.17	33.2
Westboro	51	−8	24.6	3.32	26.0
Weston	50	−10	24.6	3.75	31.4
Williamstown	47	−12	19.6	2.31	19.5
Winchendon	.....	.....	.....	3.51	30.5
Worcester *a*	47	−10	22.4	.....	.....
Worcester *b*	50	−10	24.0	5.25	42.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan.	°	°	°	*Ins.*	*Ins.*
Adrian	62	−17	18.7	2.06	0.8
Agricultural College	55	−24	16.8	1.51	3.0
Allegan	50	−35	18.5	2.35	16.0
Alma	50	−24	16.4	1.18	2.0
Ann Arbor	60	−16	19.0	1.54	2.5
Arbela	54	−24	17.0	1.90	3.0
Baldwin	45	−49	10.7	1.49	12.1
Ball Mountain	56	−17	17.0	0.73	1.1
Baraga	41	−36	4.7	0.82	7.0
Battlecreek	50	−24	18.3	2.16	6.4
Bay City	51	−21	16.2	1.10	2.5
Berlin	55	−22	15.9	1.46	3.8
Berrien Springs	50	−17	17.9	2.70	11.0
Big Rapids	46	−36	12.1	2.18	9.0
Birmingham	56	−19	18.5	1.41	2.5
Boon	.....	.....	.....	1.49	15.1
Calumet	42	−22	8.0	1.34	15.0
Camden	58[x]	−19[x]	13.2[x]	1.95	.....
Carsonville	55	−22	15.8	0.84	T.
Charlevoix	45	−32	11.2	1.84	15.5
Cheboygan	46	−36	11.4	1.39	7.0
Clinton	62	−20	19.4	1.64	0.7
Coldwater	56	−17	19.0	1.91	4.0
East Tawas[4]	46	−21	12.0	.....	.....
Eloise	59	−15	19.6	2.17	0.8
Ewen	49	−47	4.4	0.75	7.5
Fairview	58	−17	17.0	1.28	2.2
Fitchburg	56	−22	17.7	2.19	7.0
Flint	55	−26	16.1	1.31	2.0
Frankfort	51	−32	14.2	1.81	12.7
Gladwin	47	−31	13.6	1.90	10.0
Grand Rapids	50	−24	14.9	1.76	3.4
Grape	62	−15	21.0	2.05	T.
Grayling	46	−41	9.0	0.45	3.0
Hanover	56	−21	17.3	2.09	8.1
Harrison	44	−36	11.6	0.80	5.0
Harrisville	51	−25	14.2	1.38	12.6
Hart	47	−35	15.4	1.25	5.5
Hastings	51	−31	15.7	1.74	8.1
Hayes	48	−27	15.0	0.70	1.0
Hillsdale	57	−17	17.9	2.02	0.5
Holland[*9]	49	−34	19.8	.....	.....
Howell	54	−24	18.8	2.38	5.0
Humboldt	40	−49	0.8	0.70	1.5
Ionia	48	−25	16.0	0.58	T.
Iron Mountain	46	−33	8.8	1.24	11.0
Ishpeming	40	−32	6.6	1.01	8.3
Ivan	46	−30	12.6	0.50	6.5
Jackson	57	−16	19.0	1.59	.....
Jeddo	54	−20	15.9	1.11	3.2
Kalamazoo	50	−19	18.2	1.80	5.2
Lake City	44	−41	10.6	1.35	13.5
Lansing	59	−19	17.0	1.65	6.0
Lapeer	53	−24	14.9	1.70	3.0
Lathrop	47	−40	6.8	1.00	10.0
Ludington	65	−37	15.0	1.10	6.7
Luzerne	46	−38	8.4	1.76	15.0
Mackinaw City	45	−25	9.7	0.85	7.0
Madison	59	−18	19.0	1.95	2.7
Mancelona	46	−43	8.3	0.80	8.0
Manistique	42	−28	8.2	0.95	9.0
Middle Island[*10]	46	−18	14.0	.....	.....
Midland	49	−25	15.2	.....	.....
Mottville	54	−26	17.5	2.27	1.2
Mount Clemens	54	−16	18.0	0.75	....
Mount Pleasant	47	−29	14.0	.....	
Muskegon	45	−30	14.9	1.89	5.0
Newberry	44	−32	7.0	.....	.....
Old Mission	45	−23	14.2	0.60	6.0
Olivet	56	−19	18.0	3.18	5.5
Omer	49	−28	12.5	1.66	12.5
Ovid	54	−23	16.4	1.19	3.0
Owosso	54	−21	17.0	1.60	.....
Parkville	.....	.....	.....	2.54	7.0
Petoskey	44	−29	11.5	1.32	9.0
Plymouth	60[x]	−20	17.4	1.83	4.0
Port Austin	50	−25	15.3	0.99	.....
Powers	46	−39	7.2	0.70	7.0
Reed City	43	−42	8.6	0.90	3.5
Rockland	49	−29	6.4	0.76	7.3
Rogers City	47	−23	12.2	1.30	4.0
Saginaw	57	−20	18.0	1.38	2.8
St. Ignace	46	−30	11.2	0.72	6.0
St. Johns	52	−22	17.6	1.40	3.5
St. Joseph	50	−12	20.0	2.19	.....
Sandbeach	50	−21	16.4	0.95	0.5
Sidnaw	42	−43	4.0	1.67	16.8
Somerset	51	−18	17.6	2.94	2.0
South Haven	50	−22	16.7	1.00	6.0
Stanton	48	−26	14.8	0.96	2.0
Thomaston	48	−46	4.6	0.40	4.0
Thornville	54	−22	17.4	1.71	4.5
Thunder Bay Island[*10]	42	−20	15.4	.....	.....
Traverse City	52	−33	11.6	0.39	3.0
Valley Center	56	−25	14.3	1.00	.....
Vandalia	54	−21	18.0	2.86	7.5
Vassar	54	−25	16.6	1.13	1.2
Vermillion Point[*10]	40	−29	8.6	.....	.....
Wasepi	53	−22	17.9	2.33	2.0
Waverly	48	−43	14.6	2.04	8.3
West Harrisville	45	−26	11.2	1.32	8.5
Wetmore	44	−40	4.7	0.65	6.0
White Cloud	46	−36	12.7	2.12	2.0
Ypsilanti	59	−16	18.9	2.05	2.5
Minnesota.					
Ada	47	−42	0.0	0.68	1.0
Albert Lea	49	.....	.....	1.14	11.8
Alexandria	48	−36	8.6	0.39	3.9
Beardsley	52	−37	6.0	0.37	3.7
Bermidji	44	−48	1.6	0.12	1.2
Bird Island	48	−32	6.0	0.72	7.2
Blooming Prairie	46	−36	5.6	0.95	9.5
Brainerd	46	−41	3.0	0.39	5.5
Caledonia	44	−35	6.6	2.41	16.0
Camden	46	−38	4.6	0.42	7.0
Collegeville	46	−34	8.4	0.86	6.0
Crookston	42	−40	0.8	0.05	0.5
Deephaven	.....	.....	.....	1.50	15.0
Detroit City	47	−53	−3.3	0.28	1.5
Farmington	47	−40	5.0	1.50	12.5
Fergus Falls	48	−38	3.5	0.34	3.0
Glencoe	50	−38	10.3	1.33	13.3
Glenwood	48	−35	5.3	0.54	4.5
Grand Meadow	48	−36	4.1	1.16	15.0
Hallock	39	−46	−4.1	.....	.....
Lake City	46	−39	7.4	0.47	7.0
Lake Jennie	48	−33	7.1	0.67	6.0
Lakeside	48	−34	6.4	0.18	2.2
Lake Winnibigoshish	45	−40	0.9	0.36	4.0
Leech Lake	45	−39	−3.6	0.33	4.0
Long Prairie	43	−40	2.2	0.94	3.4
Luverne	55	−35	6.2	0.97	6.8
Lynd	53	−29	8.0	0.53	5.2
Mapleplain	49	.....	.....	1.53	15.0
Milaca	48	−41	3.0	1.10	11.0
Milan	51	−40	5.8	1.35	11.0
Minneapolis *a*	47	−36	5.8	1.21	11.9
Minneapolis *b*[1]	50*	−36	6.2	0.96	9.3
Minnesota City[*1]	48	−35	9.9	1.09	11.0
Montevideo	51	−38	6.6	.....	.....
Morris	48	−38	5.3	0.26	2.5
Mount Iron	45	−42	0.0	0.50	5.0
Newfolden	36	−44	−4.4	0.10	.....
New London	46	−36	3.3	0.90	3.5
New Richland[*1]	46	−36	6.6	.....	.....
New Ulm	50	−31	8.5	1.56	15.2
Park Rapids	43	−51	−1.0	0.28	2.8
Pine River	45	−42	1.0	0.52	6.2
Pipestone	54	−38	3.8	0.35	5.0
Pleasant Mounds	55	−36	7.7	1.30	14.0
Pokegama Falls	45	−50	−1.6	0.52	6.4
Redwing	.....	.....	.....	4.39	27.5
Reeds	.....	.....	.....	0.55	8.1
Rolling Green	51	−33	6.5	1.80	16.0
Roseau	33°	−47°	−6.6°	0.18	3.4
St. Charles	49	−35	7.3	0.89	8.8
St. Cloud	46	−35	5.6	1.05	8.0
St. Olaf	45	−36	3.5	0.33	2.5
St. Peter	50	−29	8.7	1.78	15.7
Sandy Lake Dam	47	−48	0.6	0.42	6.3
Shakopee	49	−33	8.8	0.77	7.3
Slayton	49	−37	5.5	.....	.....
Tower	46	−49	1.8	1.80	12.0
Two Harbors	55	−36	7.8	0.61	11.2
Wabasha[*1]	44	−36	7.1	0.90	11.0
Willmar	48	−38	4.4	0.92	6.1
Willow River	51	−45	4.5	0.44	8.0
Winnebago City	55	−25	10.1	1.38	.....
Worthington	52	−37	4.8	1.50	15.2
Zumbrota[1]	44*	−41	6.8	.....	.....
Mississippi.					
Aberdeen	72	−15	32.9	7.13	6.0
Agricultural College	71	− 8	37.0	8.99	4.0
Austin	66	− 9	34.2	4.01	1.0
Batesville	60	− 5	29.2	3.75	2.0
Bay St. Louis	76	2	46.6	4.13	1.0
Biloxi	74	1	47.2	5.16	0.4
Booneville	72	− 9	33.6	5.54	.....
Briers	72	4	41.1	.....	.....
Brookhaven	77	−10	41.1	5.37	.....
Canton	75	− 3	40.0	3.63	5.7
Columbus *a*	.....	.....	.....	8.55	4.0
Crystal Springs	76	− 7	41.4	.....	.....
Edwards	74	− 5	40.1	3.60	5.0
Fayette	77	− 3	40.6	2.89	3.4
French Camps	.....	.....	.....	5.54	8.9
Greenville *a*	66	− 5	35.3	4.53	1.4
Greenville *b*	71	5	36.0	4.57	2.2
Greenwood	73	− 6	39.6	3.96	6.0
Hattiesburg	73	− 1	44.1	2.83	.....
Holly Springs	71	− 7	38.9	3.21	1.0
Kosciusko	71	− 8	37.7	4.74	8.9
Lake	71	−10	37.3	2.94	0.9
Leakesville	80	− 5	47.9	4.93	5.3
Logtown	77	5	48.7	4.19	1.5
Louisville	68	−13	33.7	5.14	8.0
Macon	73	− 5	37.0	.....	.....
Magnolia	79	− 1	44.0	2.78	5.0
Natchez	77	2	43.5	2.35	.....
Okolona	72	.....	.....	1.92	1.5
Palo Alto	73	−10	36.5	6.18	8.9
Pontotoc	74	−11	34.2	4.66	5.2
Port Gibson	77	− 3	40.3	2.80	4.5
Ripley	72	−12	28.7	4.91	4.0
Rosedale	70	− 5	31.7	.....	.....
Stonington[*1]	76	− 6	42.1	.....	.....
Tupelo	.....	.....	.....	5.82	.....
Walnut Grove	77	− 7	42.2	2.14	3.8
Water Valley[*1]	70	− 6	35.1	5.25	3.5
Waynesboro	74	− 2	40.6	5.41	6.0
Woodville	77	− 3	43.8	3.71	2.0
Yazoo City	75	− 2	36.6	3.67	5.2
Missouri.					
Appleton City	62	−27	21.5	2.16	4.5
Arthur[*3]	.....	−26	18.4	2.45	7.0
Avalon	60	−27	17.0	1.57	3.0
Bethany	60	−25	17.4	1.30	10.0
Birchtree	71	−32	23.9	3.04	6.0
Boonville	.....	.....	.....	2.54	7.2
Brunswick	60	−27	17.0	2.36	6.5
Carrollton	59	−20	20.2	1.89	6.8
Conception	59	−24	18.9	0.85	8.5
Cook Station	.....	−30	.....	2.56	4.3
Cowgill[*5]	62	−25	17.9	1.87	2.0
Darksville	58	−27	16.7	.....	.....
East Lynne[*3]	.....	−26	16.6	2.37	5.8
Edgehill[*5]	58	−20	21.0	3.09	7.6
Eightmile[*1]	59	−29	20.0	2.23	5.1
Eldon	60	−28	19.4	2.20	8.0
Elmira	64	−24	17.2	1.26	2.1
Fairport	.....	....	.....	1.12	3.7
Farmersville	.....	.....	.....	1.15	1.5
Fayette	56	−26	17.6	2.18	5.8
Fulton	.....	.....	.....	2.79	6.5
Galena	.....	.....	.....	1.52	3.5
Gallatin[*1]	60	−25	17.0	1.24	4.0
Gayoso	68	−22	29.0	2.70	4.5
Glasgow	56	−26	18.2	2.13	6.0
Gordonville[*3]	.....	−25	21.4	3.23	11.0
Gorin	.....	.....	.....	1.39	1.0
Halfway	67	−29	23.0	2.12	2.0
Harrisonville	61	−28	15.6	1.62	3.2
Hermann	.....	.....	.....	2.63	8.0
Houston	70	−31	24.8	2.38	5.0
Houstonia	.....	.....	.....	2.54	10.6
Irena	.....	.....	.....	0.89	3.6
Ironton	70	−26	22.1	3.60	11.0
Jefferson City	62	−25	19.1	2.67	6.0
Kidder	59	−26	16.8	1.46	3.2
Lamar	67	−25	24.9	2.14	2.0
Lamonte	.....	.....	.....	2.18	3.0
Lebanon	67	−28	22.6	2.85	3.5
Lexington	62	−26	19.6	1.85	5.0
Liberty	61	−29	16.6	1.59	8.0
Louisiana	62	−21	20.6	1.93	2.1
McCune[*1]	59	−24	19.4	2.69	3.5
Marblehill	72	−31	23.7	3.34	6.8
Marshall	58	−25	17.6	2.31	7.5
Maryville	61	−28	11.6	0.83	8.0
Mexico	58	−25	19.6	2.32	6.1
Miami	.....	.....	.....	2.13	4.4
Mineralspring	68	−28	24.2	1.52	4.0
Montreal	66	−30	21.2	1.91	5.0
Mount Vernon	60	−25	24.7	1.01	3.2
Neosho	69	−30	25.2	1.78	3.5
Nevada[*1]	65	−27	20.4	1.82	3.0
New Haven	65	−21	21.7	3.15	7.5
New Madrid	68	−18	28.4	6.84	9.5
New Palestine	.....	−26	.....	1.97	5.5
Oakfield	68	−21	23.1	3.19	7.1
Olden	60	−29	22.9	3.23	6.5
Oregon *a*	62	−26	16.0	1.28	7.3
Oregon *b*	65	−26	17.2	1.23	8.6
Palmyra[*5]	60	−24	19.5	1.60	8.0
Phillipsburg[*1]	65	−29	22.2	2.16	1.8
Pickering[*2]	.....	−27	13.3	1.11	5.0
Poplarbluff	70	−25	25.9	3.08	5.5
Potosi	68	−28	20.6	3.05	13.0
Princeton	58	−26	16.1	0.91	4.0
Rhineland	65	−31	20.1	2.80	7.2
Richmond	60	−24	17.8	1.75	2.0
Rolla	.....	.....	.....	2.24	4.3
St. Charles	63	−22	22.4	3.04	7.0
St. Joseph	.....	.....	.....	1.02	3.5
Sarcoxie[*3]	.....	−18	18.4	1.31*	.....
Sedalia	55	−30	18.2	2.75	6.5
Seymour	65	−26	22.4	1.91	2.2
Shelbina	.....	.....	.....	2.17	2.8

TABLE II.— *Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Sikeston	68	−23	25.2	3.52	11.0
Steffenville	61	−24	19.5	2.15	7.0
Stellada	57	−29	19.2	2.07	5.5
Sublett	57	−24	15.9	2.14	4.1
Unionville	.....	−25	.....	0.71	2.0
Vichy	69	−29	23.5	2.61	4.0
Warrensburg	59	−26	20.0	2.17	4.0
Warrenton	63	−22	18.4	3.24	9.0
Wheatland	.....	.....	.....	2.47	4.2
Willow Springs	69	−28	22.3	3.12	5.0
Wylie	72	−25	27.0	1.33	T.
Zeitonia	72	−32	22.2	2.12	7.0
Montana.					
Adel	47	−50	7.4	0.74	7.4
Augusta	52	−40	10.2	.....	.....
Big Timber	48	−44	12.5	0.22	3.5
Billings	55	−49	8.9	T.	T.
Boulder	50	−38	12.3	0.50	5.0
Butte	45	−28	14.8	1.39	14.0
Canyon Ferry	47	−34	10.8	0.62	.....
Castle	40	−36	11.4	1.35	.....
Columbia Falls	42	−27	12.4	1.85	19.0
Corvallis	50	−39	16.3	1.61	16.0
Crow Agency	53	−46	9.2	0.37	3.5
Darby [3]	.....	−38	.....	3.85	38.5
Dearborn Canyon	59	−33	10.8	0.80	8.0
Deer Lodge	49	−40	13.2	2.30	23.0
Dell	46	−35	11.7	0.47	3.5
Dupuyer	50	−33	9.0	.....	.....
Ekalaka	44	−39	2.3	0.32	3.2
Florence	47	−28	17.2	2.18	.....
Fort Keogh	48	−55	1.1	0.80	8.0
Fort Logan	45	−61	4.2	0.40	.....
Glasgow	57	−50	−1.0	1.20	.....
Glendive	50	−41	4.0	0.80	8.0
Glenwood	43	−35	9.8	2.05	.....
Greatfalls	49	−35	11.0	0.35	4.8
Kalispel	45	−26	14.6	1.30	13.0
Kipp	48	−46	5.0	0.49	4.9
Livingston	46	−34	13.1	1.26	14.1
Manhattan	50	−45	10.8	0.90	9.0
Martinsdale	43	−38	11.4	0.90	9.0
Marysville	42	−30	9.8	1.16	15.5
Missoula	46	−22	16.9	1.36	15.3
Parrot	48	−30	14.8	0.20	2.0
Plains	50	−25	19.6	0.10	1.0
Poplar	45	−42	−0.8	2.05	16.5
Radersburg	.....	.....	.....	0.95	9.5
Redlodge	55	−40	8.1	1.00	10.0
Ridge	45	−39	8.1	.....	.....
St. Ignatius	48	−26	16.5	1.07	14.5
St. Pauls	45	−51	3.2	1.12	.....
Shelby	52	−46	5.1	0.50	5.0
Troy	51	−26	22.0	1.43	12.0
Twin Bridges	49	−35	15.1	0.46	5.0
Utica	60	−34	10.2	0.38	6.5
Wibaux	45	−42	5.6	0.50	5.0
Yale	55	−37	21.2	0.30	3.0
Nebraska.					
Agee [*1]	58	−30	10.6	0.13	.....
Albion	62	−30	13.3	1.10	11.0
Alliance	.....	.....	.....	0.55	5.5
Alma	67	−38	16.2	0.41	4.1
Ansley	64	−36	12.6	0.85	8.5
Arapaho [*1]	54	−37	15.8	0.60	6.0
Arborville [*1]	64	−28	12.1	0.58	6.0
Ashland *a*	65	−28	14.7	0.80	8.0
Ashland *b* [*1]	63	−26	13.3	0.77	8.5
Ashton	.....	.....	.....	0.36	3.5
Auburn	65	−28	16.0	1.08	8.8
Aurora [*1]	55	−32	15.3	0.75	7.5
Bartley	.....	.....	.....	0.07	1.0
Bassett	.....	.....	.....	0.40	3.5
Beatrice	63°	−33°	16.5°	0.85	8.5
Beaver City	65	−35	16.5	0.32	3.5
Bellevue	.....	.....	.....	0.43	4.1
Benedict	.....	.....	.....	1.10	11.0
Benkleman	.....	.....	.....	0.40	4.0
Blair	62	−29	12.1	0.39	4.5
Bluehill	.....	.....	.....	0.80	8.0
Bradshaw	.....	.....	.....	1.05	10.5
Brokenbow [*1]	56	−36	10.4	0.22	2.2
Burchard	.....	.....	.....	1.10	11.0
Burwell	.....	.....	.....	0.60	6.0
Callaway	58	−36	12.4	0.55	5.5
Camp Clarke	52	−47	8.1	0.80	8.0
Central City	.....	.....	.....	0.75	7.5
Chester	.....	.....	.....	1.17	11.2
Clatonia	58	−31	11.0	1.10	11.0
Cody	.....	.....	.....	0.20	2.0
Columbus	64	−29	13.9	0.72	8.2
Creighton	60	−33	9.2	0.55	.....
Crete	64	−27	14.0	0.98	9.6
Culbertson	.....	.....	.....	1.07	10.8
Curtis	62	−36	13.0	0.30	3.0
David City	50	−30	13.3	0.75	7.5
Dawson	67	−30	17.5	0.82	9.6
Eden	.....	.....	.....	0.85	8.5
Edgar *a* [*2]	62	−37	14.6	1.20	12.0
Edgar *b*	.....	.....	.....	1.55	15.5
Elba	.....	.....	.....	0.60	6.0
Ericson [*1]	56	−35	9.1	0.60	6.0
Ewing	.....	.....	.....	0.55	5.5
Fairbury	68	−38	15.2	0.50	6.0
Fairfield	.....	.....	.....	1.47	14.8
Fairmont	66	−32	12.6	0.60	6.0
Fort Robinson	57	−37	9.8	0.56	5.6
Franklin	66°	−39°	10.8°	0.75	7.5
Fremont	62	−29	13.0	0.81	7.5
Geneva	64	−32	14.8	1.45	14.5
Genoa	68	−30	12.8	0.78	7.9
Gering	49	−45	7.4	1.04	10.2
Gothenburg	62	−33	14.4	1.00	10.0
Grand Island *a*	.....	.....	.....	0.72	7.2
Grand Island *b*	66	−34	14.4	0.68	6.8
Grand Island *c*	55	−33	11.0	.....	.....
Greeley	.....	.....	.....	0.20	2.0
Haigler	.....	.....	.....	T.	T.
Hartington	60	−33	8.2	1.40	14.0
Harvard	64	−33	13.8	1.05	11.5
Hastings [*1]	64	−30	14.0	1.25	12.5
Hayes Center	.....	.....	.....	1.28	12.8
Hay Springs	51	−41	8.4	0.50	4.2
Hebron	66	−34	14.8	1.29	11.5
Hickman	.....	.....	.....	0.70	7.0
Holdrege [*1]	59	−43	8.0	0.30	3.0
Hooper [*1]	60	−32	11.4	0.78	8.0
Imperial	55	−35	13.2	0.92	9.2
Johnstown	.....	.....	.....	0.65	6.5
Kearney	.....	.....	.....	0.60	6.0
Kennedy	58	−35	10.6	0.75	7.5
Kimball	47	−30	11.4	0.50	5.0
Kirkwood [*1]	60	−33	9.1	0.44	4.5
Lexington	60	−39	13.6	1.25	12.5
Lincoln *b*	63	−26	13.6	0.73	7.5
Lincoln *d*	62	−24	16.0	0.58	5.7
Lodgepole	54	−36	11.2	0.79	7.0
Loup [*1]	56	−38	11.4	T.	T.
Lynch [*1]	64	−33	9.6	0.38	3.8
Lyons	.....	.....	.....	0.69	7.0
McCook	.....	.....	.....	0.40	4.0
McCool	.....	.....	.....	0.75	8.5
Madison	70	−30	12.1	0.75	7.5
Madrid [*5]	60	−37	12.3	0.60	6.0
Marquette	.....	.....	.....	0.35	3.5
Merriman	.....	.....	.....	0.30	1.5
Minden *a*	64	−33	13.7	0.98	11.0
Minden *b*	.....	.....	.....	0.89	.....
Nebraska City *b*	.....	.....	.....	0.70	7.0
Nebraska City *c*	64	−26	16.4	0.98	.....
Nemaha [*1]	60	−27	14.4	0.70	7.0
Nesbit	58	−34	10.4	0.35	5.0
Norfolk	62	−35	10.0	0.95	9.5
North Loup	63	−31	12.2	0.50	5.0
Oakdale	62	−33	8.8	0.47	4.7
Odell	.....	.....	.....	0.80	8.0
O'Neill	63	−33	10.2	0.13	1.3
Ord	.....	.....	.....	0.34	3.0
Osceola	.....	.....	.....	0.96	9.6
Ough	.....	.....	.....	0.60	6.0
Palmer	.....	.....	.....	0.75	7.5
Palmyra	.....	.....	.....	0.57	4.0
Paxton	.....	.....	.....	0.60	6.0
Plattsmouth	.....	.....	.....	0.45	4.5
Pleasant Hill	.....	.....	.....	0.85	8.5
Ravenna *a*	65	−36	12.8	0.89	8.9
Ravenna *b*	.....	.....	.....	0 95	9.5
Redcloud *a*	.....	.....	.....	0.90	9.0
Republican [*1]	60	−40	14.9	0.30	3.0
Rulo	.....	.....	.....	0.50	5.0
St. Libory	.....	.....	.....	0.60	6.0
St. Paul	.....	.....	.....	0.56	5.2
Salem [*1]	58	−26	12.2	0.85	8.5
Santee Agency	64	−33	11.4	0.95	9.5
Schuyler	.....	.....	.....	0.45	4.5
Seneca [*1]	50	−26	9.0	0.20	2.0
Seward [*1]	57	−26	14.4	1.20	12.0
Sprague	.....	.....	.....	0.80	8.0
Springview	55	−30	9.4	0.25	2.5
Stanton	.....	.....	.....	0.75	7.5
State Farm	65	−27	13.6	0.65	6.5
Stockham	.....	.....	.....	0.90	9.0
Strang [*1]	54	−32	13.1	1.40	14.0
Stratton	.....	.....	.....	0.36	4.5
Superior [*5]	52	−36	14.1	1.60	16.0
Syracuse	.....	.....	.....	0.50	5.0
Tablerock	.....	.....	.....	0.30	10.0
Tecumseh *b*	74	−36	14.4	0.60	6.0
Tecumseh *c*	.....	.....	.....	0.55	4.5
Tekamah	64	−29	13.2	0.86	8.0
Thedford	.....	.....	.....	0.28	2.8
Turlington	64	−25	14.8	0.93	9.0
Valentine	59	−37	9.6	0.45	.....
Valparaiso	.....	.....	.....	0.53	5.2
Wakefield	61	−32	9.8	0.87	8.7
Wallace	.....	.....	.....	0.80	.....
Wauneta	.....	.....	.....	0.95	9.5
Weeping Water [*1]	61	−29	12.0	0.91	8.0
Wellfleet	64	−24	19.7	0.92	9.2
Westpoint	67	−29	14.8	0.59	6.3
Whitman	.....	.....	.....	0.20	2.0
Wilber [*1]	66	−30	15.9	0.65	6.5
Willard	.....	.....	.....	0.07	.....
Wilsonville [*1]	60	−37	14.9	0.40	4.0
Wisner	.....	.....	.....	0.62	7.0
Wymore [*1]	55	−32	15.2	1.10	10.0
York [*1]	63	−28	13.9	0.50	5.0
Nevada.					
Battle Mountain [*1]	57	−10	30.8	T.	T.
Beowawe [*1]	58	−14	29.4	0.45	4.5
Blaine	52	−25	28.4	1.80	11.0
Candelaria	73	− 2	38.8	0.05	0.5
Carlin [*1]	52	2	29.1	0.75	4.0
Carson City	69	− 4	37.8	0.35	4.5
Clover Valley	.....	.....	.....	2.47	7.0
Cranes Ranch	.....	.....	.....	1.20	.....
Elko	48	−16	27.4	0.65	5.0
Elko (near)	61	−26	31.8	0.67	6.7
Ely	51	−17	28.7	0.80	8.0
Empire Ranch	53	−25	30.2	0.69	9.0
Fenelon [*1]	48	−21	21.5	1.19	11.0
Golconda [*1]	58	−20	30.2	0.40	4.0
Halleck [*1]	52	−24	26.1	0.45	4.5
Hawthorne *b*	65	2	38.4	T.	T.
Hot Springs	65	0	34.8	T.	T.
Humboldt [*1]	60	− 5	35.3	0.15	1.5
Lee	.....	.....	.....	1.57	18.0
Lewers Ranch	65	− 6	36.8	0.69	9.2
Los Vegas	70	11	42.4	0.00	0.0
Lovelocks	.....	.....	.....	0.05	0.5
McGill	59	−14	28.4	0.57	2.0
Martins	66	− 3	37.0	.....	.....
Mill City [*1]	55	− 4	33.1	T.	T.
Monitor Mill	49	−16	27.7	0.72	7.2
Palisade [*1]	59	−12	31.0	1.35	7.0
Palmetto	64	−17	32.9	T.	T.
Panaca	65	− 5	35.6	T.	T.
Reno [*1]	68	0	36.7	0.35	3.5
Reno State University	.....	0	.....	0.65	.....
St. Clair	62	− 7	35.1	0.05	1.0
Silverpeak	68	4	41.6	T.	.....
Sodaville	68	3	40.4	T.	T.
Tecoma [*1]	52	− 8	26.4	0.20	2.0
Toano [*1]	.....	.....	.....	1.05	7.5
Tuscarora	45	−25	21.4	2.07	.....
Tybo	55	.....	.....	0.04	.....
Verdi [*1]	70	− 4	43.1	0.55	5.5
Wadsworth [*1]	68	−12	37.2	0.30	3.0
Wells	49	−29	25.0	0.71	3.0
New Hampshire.					
Alstead [*6]	48	−13	18.9	3.50	24.2
Berlin Mills	51	−29	15.1	4.26	31.0
Bethlehem	49	−16	16.6	3.87	34.0
Brookline [*1]	52	−20	22.0	3.35	31.2
Claremont	54	−14	21.1	2.33	18.8
Concord	51	−18	20.8	2.40	24.0
Durham	52	− 7	22.2	2.01	21.5
Grafton	55	−23	16.8	2.97	25.0
Hanover	55	−22	18.0	1.89	21.5
Keene	52	−18	20.2	3.19	28.0
Littleton	46	−17	14.5	4.43	37.0
Nashua	51	−16	22.0	3.15	33.2
Newton	52	− 9	22.0	2.61	27.5
North Conway	55	−18	18.2	3.02	25.0
Peterboro	48	−16	19.8	3.67	30.9
Plymouth	49	−12	17.2	2.06	19.5
Sanbornton	53	−13	19.0	2.89	31.0
Stratford	49	−26	15.3	2.90	29.0
Warner	.....	.....	.....	2.49	20.0
New Jersey.					
Asbury Park	57	−10	27.5	7.66	27.4
Barnegat	52	− 7	27.7	6.25	23.0
Bayonne	53	− 4	26.8	6.17	34.4
Belvidere	52	−11	23.4	5.23	30.1
Bergen Point	53	− 4	27.4	5.44	26.5
Beverly	57	−10	25.4	6.97	37.8
Billingsport [*1]	54	− 7	25.6	6.26	24.7
Boonton	53	−11	24.8	4.93	22.0
Bridgeton	60	− 7	27.6	5.67	32.0
Camden	54	− 9	25.4	6.36	31.5
Cape May C. H.	56	− 5	28.5	6.10	33.4
Charlotteburg	57	− 8	24.1	5.60	29.0
Chester	56	−14	24.0	4.60	23.0
Clayton	56	−13	25.7	6.54	36.5
College Farm	53	−11	25.3	5.37	29.0
Deckertown	53	−17	23.1	5.13	31.5
Dover	59	−10	23.2	5.00	25.0
Egg Harbor City	58	−12	26.2	8.27	52.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Elizabeth	55	−10	26.1	6.70	39.0
Englewood	52	−16	23.0	7.17	30.3
Flemington	55	−11	24.6	4.86	34.4
Freehold	53	−11	25.6	6.76	32.6
Friesburg	56	−11	25.8	6.04	28.5
Hammonton				6.35	40.0
Hanover	50	−10	24.0	6.43	32.5
Hightstown	55	− 9	26.0	6.35	35.0
Imlaystown	54	−11	26.5	6.50	33.7
Lebanon				5.13	18.0
Moorestown	54	−13	24.8	6.30	30.6
Mount Pleasant				5.27	28.0
Newark	55	− 9	25.4	5.37	26.0
New Brunswick	56	−10	26.4	5.51	28.8
Newton	57	−13	23.6	5.09	
Ocean City	54	− 8	28.3	7.35	24.0
Oceanic	52	−11	26.3	5.14	25.5
Paterson	60	− 4	28.1	5.55	27.8
Perth Amboy	52	−10	25.6	4.87	25.0
Plainfield	53	− 9	24.6	5.79	32.9
Port Norris	54	− 8	27.7	6.98	36.8
Rancocas				6.08	28.8
Rivervale	55	−17	23.0	6.77	44.0
Roseland	57	−12	23.8	5.68	32.0
Salem	56	− 9	26.6	6.46	30.0
Somerville	56	−10	25.4	5.53	30.0
South Orange	53	− 9	24.9	5.68	23.0
Staffordville				8.77	40.0
Toms River	57	−14	25.9	8.18	34.0
Trenton	56	−10	26.3	5.79	34.0
Vineland	59	−13	26.0	6.62	33.5
Woodbine	56	−10	27.6	5.70	26.0
New Mexico.					
Albert	65	− 5	30.9	0.72	2.5
Albuquerque	62	1	36.0	0.35	3.5
Aztec	56	−23	26.8	0.65	6.5
Bernalillo	66	1	37.5		T.
Bluewater	57	− 8	30.9	0.50	3.0
Deming [1]	72	10	42.4	T.	T.
East Lasvegas	63	−22	32.0	0.73	8.0
Eddy	79	1	42.8	0.20	1.0
Engle	60	− 5	33.6	0.11	1.1
Espanola	60	− 5	32.0	0.10	1.0
Folsom	55	−21	23.6	0.46	7.0
Fort Bayard	65	3	38.6	0.20	2.0
Fort Union	65	−17	29.2	0.50	5.0
Fort Wingate	60	3	31.0	0.08	6.8
Gage [1]	66	16	43.7	0.20	2.0
Gallisteo	64	1	35.0	0.85	8.5
Gallinas Spring	66	−20	30.8	0.47	5.0
Gila	74	7	42.8	0.54	2.5
Hillsboro				T.	T.
Las Vegas Hotsprings	60	−19	30.6	0.73	8.0
Lordsburg [1]	69	9	41.0	0.08	0.8
Los Lunas	68	0	38.2	T.	T.
Lower Penasco	67	− 9	34.4	0.20	2.0
Mesilla Park	76	2	40.3	0.09	0.7
Monero	44	−26	20.2	1.00	7.5
Olio	54	− 4	27.6	0.20	2.0
Puerto de Luna	66	− 9	36.2	0.40	4.0
Raton	58	−16	28.3	0.20	2.0
Rincon	79	7	42.2	0.20	2.0
Roswell	76	− 6	38.7	0.15	1.5
San Marcial	77	5	43.1	0.05	0.5
Socorro	78	3	36.8	0.00	0.0
Springer	70	−26	25.8	1.20	12.0
Strauss [1]	82	10	46.4	0.00	
White Oaks	60	−12	34.0	0.50	5.0
Winsors Ranch	52	−27	23.2	2.20	
New York.					
Adams				1.93	
Addison	52	−26	20.6	1.49	16.0
Akron				1.98	
Alfred	48	−21	17.8	1.68	10.5
Angelica	49	−27	19.5	1.64	8.0
Appleton	50	− 6	21.4	1.89	13.0
Arcade	47	−20	17.5	1.49	7.4
Atlanta				1.54	
Auburn	55	−10	23.0	1.61	9.0
Avon	52	−13	21.0	0.80	5.2
Baldwinsville	49	−10	21.8	1.67	11.0
Bedford	56	−11	24.4	5.71	37.3
Big Sandy [10]	44	−14	18.7		
Bolivar	50	−28	19.8	1.98	10.0
Bouckville	48	−16	17.7	2.19	17.0
Boyds Corners				5.54	37.0
Brentwood	52	− 9	24.8	4.70	22.0
Caldwell	52	−27	18.1	2.38	25.5
Canajoharie	50[4]	− 8[4]	24.2[4]	0.65[4]	
Canton	47	−22	16.0	1.22	5.0
Carmel	55	− 9	23.5	5.76	33.5
Carvers Falls	48	−25	20.4	1.79	14.0
Catskill	50	− 7	22.1	3.30	30.0
Cedarhill	55	− 9	22.6	2.40	27.2
Charlotte [10]	49	− 4	25.6		
Cherry Creek				2.41	
New York—Cont'd.	°	°	°	*Ins.*	*Ins*
Cooperstown	46	−15	18.1	2.31	17.5
Cortland	48	−20	19.1	0.69	9.0
Cutchogue	48	− 1	25.8	5.50	26.5
Dekalb Junction				1.54	
Dryden	51	−18	19.1	1.28	10.0
Eagle Mills				1.89	
Easton				3.15	
Elizabethtown [1]	54	−20	22.2		
Ellenburg Depot [1]	48	−14	18.5	0.99	9.9
Elmira	58	−19	22.7	1.65	
Fayetteville				1.62	
Fleming	52	− 8	22.0	0.80	8.0
Fort Niagara	50	−10	19 8	1.63	3.0
Franklinville	48	−26	17.6	1.79	6.9
Fulton				1.80	
Garrattsville	48	−16	20.0		
Glens Falls	46	−18	19.3	2.62	21.5
Gloversville	50	−18	18.4	2.22	22.8
Greenwich	48	−20	19.2	1.76	10.0
Haskinsville				0.75	
Hemlock Lake	48	−10	21.0	0.73	5.8
Honeymead Brook	51	−16	21.9	4.00	19.1
Humphrey	49	−17	19.4	2.50	13.7
Ithaca	52	−16	21.2	1.48	18.2
Jamestown	50	−16	20.6	3.63	14.5
Keene Valley	47	−14	17.6	1.33	11.2
Kings Station				6.20	
Lake Placid	46	−22	18.5	2.30	
Liberty	48	−18	19.8		
Little Falls	47	−18	17.5		
Lockport	52	− 6	22.6	1.34	6.0
Lowville	46	−20	16.1	2.30	15.0
Lyndonville				1.40	
Lyons	50	− 6	23.7	1.26	9.0
Madison Barracks	55°	−24	19.0	2.70	20.0
Middletown	50	−10	22.6	6.01	33.5
Mohonk Lake [1]	52*	−11	22.0		
Mount Morris	57	−17	23.6	0.65	6.0
Napoli				1.64	
Newark Valley				2.22	
New Lisbon	48	−22	17.4	1.96	18.5
Niagara Falls				1.40	
North Hammond	50	−20	18.6	1.26	7.5
North Lake	43	−30	12.2	2.92	22.0
Number Four	45	−31	13.0	2.70	24.1
Nunda	52	−17	20.2	1.98	10.0
Ogdensburg	44	−18	17.2	1.23	2.4
Oneonta	51	−14	21.4	2.60	
Oxford	48	−16	20.0	3.29	23.8
Palermo	46	−15	19.1	1.44	12.5
Penn Yan	53	−10	22.0	1.29	9.6
Perry City	47	−16	19.0	1.42	11.1
Phenix				3.41	
Pine City				2.61	
Plattsburg Barracks	47	−12	11.4		
Port Byron	50	− 7	22.1	1.34	10.0
Port Jervis	54	−11	23.2	4.04	24.5
Poughkeepsie	54	−21	22.6	4.26	
Primrose	55	− 8	24.8	5.02	27.5
Ridgeway	50	− 8	21 0	1.98	8.2
Rome	46	−12	19.0	2.35	
Romulus	53	− 8	22.8	1.00	5.3
Rose				0.92	
St. Johnsville	50	−15	20.3	1.93	14.1
Saranac Lake	48	−28	14.7	1.53	17.5
Saratoga Springs	47	−16	19.4	2.37	23.2
Schenectady	52	−12	20.8	2.83	21.5
Setauket	51	− 2	26.6	5.48	24.5
Sherwood				1.21	
Skaneateles				1.36	
South Canisteo	49	−23	18.4	1.95	11.6
Southeast Reservoir				5.84	28.8
South Kortright	48	−18	17.4	2.35	
Straits Corners	54	−20	18.5	2.09	17.8
Ticonderoga	50	−20	20.5	2.04	27.5
Victor	52	− 8	20.6	1.80	9.0
Wappingers Falls	57	−17	22.8	6.09	41.0
Warwick				3.24	
Watertown	48	−24	17.2	2.31	21.0
Waverly	52	−22	20.5	2.26	26.0
Wedgwood	54	−15	20.6	2.07	17.0
West Berne	52	−10	22.9	4.32	35.0
Westfield	54	−15	20.4	1.35	4.0
Westpoint	55	− 5	25.0	3.73	24.3
Willetspoint	52	− 6	23.1	4.58	16.5
North Carolina.					
Abshers	70	− 9	35.1	6.97	5.0
Asheville				7.36	4.2
Biltmore	68	−10	35.4	7.86	3.2
Bryson City				9.38	5.2
Chapel Hill	71	− 6	34.6	7.79	13.2
Currituck Inlet				8.09	24.0
Edenton	60	5	36.1	8.15	13.0
Experimental Farm	71	− 3	37.0	7.92	17.7
Fairbluff				5.66	16.0
Fayetteville	77	− 5	39.6	10.10	17.1
North Carolina—Cont'd	°	°	°	*Ins.*	*Ins.*
Flatrock	68	−10	33.0	10.82	3.0
Greensboro	67	− 3	35.0	8.63	13.5
Greenville	75	− 2	39.2	8.07	20.8
Henderson	68	− 2	34.9	8.47	18.0
Hendersonville	70	− 9	34.8	9.43	3.5
Horse Cove	64	−12	34.1	13.10	4.6
Lenoir [1]	65	− 8	34.9	7.26	
Linville	59	−15	29.4	7.13	8.0
Littleton	68	0	33.0	7.34	18.0
Louisburg	70	− 6	36.3	8.10	22.5
Lumberton	74	1	39.0	8.42	10.0
Mana				5.44	6.5
Marion	72	− 6	36.4	10.05	2.8
Marshall	65	−10	34.0	5.48	2.5
Mocksville	68	− 2	36.3	8.64	6.0
Moncure	73	− 3	38.6	7.59	2.7
Monroe	76	−10	39.0	8.66	12.0
Mountairy	66	− 1	32.8	6.05	5.0
Mount Pleasant	72	−16	37.6	7.30	8.0
Murphy				10.24	12.8
Oakridge	69	0	33.9	8.17	11.5
Pantego				10.65	5.0
Patterson [1]	66	− 1	32.9	6.57	4.1
Pittsboro	75	−14	35.4	7.38	16.0
Rockingham	75	−15	38.6	9.80	10.0
Roxboro	67	− 7	32.2	5.82	15.5
Salem	69	0	34.8	8.30	9.0
Salisbury	72	− 1	37.9	5.66	9.0
Saxon	72[2]	− 2[2]	33.8[2]	7.73	8.0
Selma	75	− 6	37.8	6.30	17.0
Settle	67	− 5	32.0	6.17	4.0
Sloan	75	1	43.4	8.20	13.6
Soapstone Mount	70	−16	33.8	7.51	15.0
Southern Pines *a*	75	− 4	41.4	9.33	15.0
Southern Pines *b*				9.89	12.0
Southport	68	1	43.3	4.89	3.0
Springhope [1]	69	− 1	35.3	9.05	18.0
Tarboro	74	− 2	37.6	8.05	7.0
Waynesville	55	−14	35.1	10.73	3.9
Weldon	70	− 8	35.3	8.11	18.0
North Dakota.					
Amenia	51	−40	2.4	0.04	0.4
Ashley	51	−40	0.8	0.10	1.0
Berlin	53	−40	2.7	0.26	2.6
Bottineau	36	−46	−8.4	0.27	2.7
Buxton	45	−38	0.0	0.05	0.5
Churches Ferry	41	−43	−2.6	0.17	1.7
Coal Harbor	49	−43	−1.0	0.02	0.2
Devils Lake	48	−41	0.0	0.10	1.0
Dickinson	44	−38	−0.1	0.20	2.0
Dunseith	39	−41	−5.2	0.20	2.0
Ellendale	54	−35	5.1	0.20	2.0
Fargo	50	−37	0.4	0.29	2.9
Forman	52	−29	2.4	0.16	1.6
Fort Berthold	60	−47	0.0	0.45	4.5
Fort Yates				0.05	0.5
Fullerton	54	−38	2.8	0.28	2.8
Gallatin	47	−43	−0.8	0.24	2.4
Glenullin	40	−37	3.9	0.10	1.0
Goetz	48	−40	0.2	0.05	0.5
Grafton	40	−39	−1.1	0.25	2.5
Hamilton	42	−42	−3.0	0.22	2.3
Jamestown	48	−36	2.2	T.	T.
Kelso	49	−41	−0.8		
Larimore	44	−40	−1.9	T.	T.
McKinney	42	−48	−6.2	0.04	0.4
Mayville	46	−36	3.2		
Medora	48	−41	4.2	0.52	5.2
Melville	49	−41	1.0	T.	T.
Milton	55	−45	−5.2	0.40	4.0
Minnewaukon	44	−46	−3.8	0.20	2.0
Minot	45	−39	−1.4	0.15	1.5
Napoleon	47	−40	1.0	0.50	5.0
New England City	48	−40	−1.2	0.50	5.0
Oakdale	45	−41	1.7	0.30	3.0
Portal	39	−45	0.1		
Power	50	−43	1.8	0.25	2.5
Sheyenne	46	−44	−1.0	0.31	3.1
Steele	49	−40	−1.8	T.	T.
Towner	40	−44	−4.8		
University	46	−39	3.2	0.10	1.0
Wahpeton [5]	44*	−39	2.9	0.17	1.7
Washburn	55	−40	2.8	0.25	2.5
Woodbridge	35	−46	−6.4	0.08	0.8
Ohio.					
Akron	58	−20	21.2	1.20	2.2
Ashland	58	−21	20.3	1.24	3.3
Ashtabula	56	−14	21.6	3.30	10.0
Atwater				1.61	3.0
Bangorville	61	−26	20.2	1.64	3.5
Bellefontaine	58	−21	18.0		
Bement				2.44	15.0
Benton Ridge	58	−19	20.2	1.31	2.5
Bethany	59	−22	23.0	1.81	6.0
Bigprairie	60	−20	23.4	1.99	11.0
Binola				1.74	8.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins*
Bladensburg	66	−30	21.2	1.79	3.4
Bloomingburg	60	−21	21.2	1.51	12.0
Bowling Green	57	−18	20.4	2.39	0.5
Bucyrus	55	−28	18.9	.....	.....
Cambridge	58	−33	20.4	2.05	4.0
Camp Dennison	59	−25	23.4	2.18	7.9
Canal Dover	57	−25	22.6	2.18	4.5
Canton	57	−30	22.0	1.72	5.5
Carrollton	56	−24	21.8	2.54	7.0
Cedarville	.....	.....	.....	1.85	6.0
Celina	63	−24	20.9	1.88	2.5
Circleville	60	−21	23.9	2.26	5.0
Clarksville	59	−22	23.2	1.71	5.0
Cleveland *a*	59	−18	21.7	1.95	4.7
Cleveland *b*	59	−17	20.8	1.40	1.2
Coalton	56	−38	21.2	3.70	19.0
Colebrook	54	−22	18.8	1.34	5.5
Dayton *a*	63	−28	23.2	2.01	6.0
Dayton *b*	.....	.....	.....	1.65	6.0
Defiance	64	−17	20.2	2.21	2.0
Delaware	58	−25	21.6	1.61	7.6
Dupont	60	−18	20.6	1.38	1.0
Elyria	60	−18	21.6	1.88	2.1
Findlay	62	−19	20.8	1.50	.....
Frankfort	59	−21	23.0	3.10	10.3
Garrettsville	58	−24	19.8	1.94	4.5
Granville	57	−25	20.4	1.84	7.5
Gratiot	57	−26	21.0	2.21	11.3
Greenfield	58	−15	24.5	2.05	8.5
Greenhill	55	−25	20.2	1.72	4.8
Greenville	59	−20	21.0	2.18	3.0
Hackney	60	−25	22.6	2.70	17.0
Hanging Rock	67	−27	25.0	2.97	11.0
Hedges	54	−20	20.7	1.54	0.5
Hillhouse	58	−23	18.2	2.82	12.8
Hillsboro	62	−30	23.4	2.70	11.5
Hiram	55	−22	19.8	1.77	4.0
Hudson	58	−22	19.5	.....	.....
Jacksonboro	62	−22	22.6	2.80	12.0
Kenton	62	−21	22.6	2.11	1.8
Killbuck	56	−33	21.2	0.89	3.5
Lancaster	59	−20	23.7	3.39	9.0
Leipsic	52	−20	20.7	1.82	1.0
Levering	58	−22	20.5	1.50	2.5
Logan	65	−29	24.6	1.77	9.0
Lordstown	55	−22	19.0	1.71	5.5
McArthur	60	−38	22.1	4.18	11.0
McConnelsville	63	−29	23.0	2.87	13.0
Mansfield	.....	.....	.....	2.31	3.2
Marietta	60	−22	26.5	3.52	11.5
Marion	59	−22	21.8	1.68	2.6
Medina	57	−22	21.0	1.73	2.0
Milfordton	51	−28	18.0	1.97	8.0
Milligan	63	−39	22.2	2.00	9.0
Millport	55	−25	19.8	2.69	5.0
Montpelier	60	−18	19.6	2.01	1.0
Napoleon	62	−22	21.7	2.52	T.
Neapolis	.....	.....	.....	2.50	T.
New Alexandria	56	−23	22.7	3.50	12.0
New Berlin	55	−23	21.2	1.49	4.0
New Bremen	55	−23	17.9	.....	.....
New Holland	58	−21	22.0	2.34	9.5
New Paris	57	−23	20.4	1.79	1.5
New Richmond	61	−17	25.0	2.71	13.9
New Waterford	55	−24	21.8	2.67	14.0
North Lewisburg	58	−22	19.8	2.05	4.5
North Royalton	57	−20	20.4	1.53	3.0
Norwalk	61	−22	20.1	1.94	2.0
Oberlin	60	−20	21.5	1.79	14.0
Ohio State University	59	−20	22.8	1.40	5.9
Orangeville	54	−26	19.4	1.35	5.0
Ottawa	62	−20	22.0	1.58	0.5
Pataskala	58	−24	21.5	1.97	10.7
Perry	.....	.....	.....	2.51	11.0
Philo	64	−20	23.7	2.16	8.0
Plattsburg	58	−23	21.4	1.86	10.0
Pomeroy	63	−27	26.6	4.44	15.3
Portsmouth *a*	.....	.....	.....	3.80	15.0
Portsmouth *b*	64	−18	27.9	4.39	14.0
Pulse	.....	.....	.....	2.90	14.5
Richwood	58	−26	21.4	1.93	5.2
Ridgeville Corners	61	−18	21.0	2.21	T.
Ripley	59	−21	23.9	2.96	13.1
Rittman	57	−23	19.4	1.10	0.5
Rockyridge	61	−18	21.1	1.80	T.
Rosewood	58	−22	20.8	2.03	3.5
Seaman	57	−26	23.3	1.92	9.0
Shenandoah	58	−23	19.6	1.56	2.4
Sidney	60	−25	19.1	2.34	7.7
Sinking Spring	55	−24	23.3	2.93	16.0
Somerset	.....	.....	.....	1.85	4.8
Springboro	.....	.....	.....	1.55	.....
Strongsville	.....	.....	.....	1.97	3.5
Thurman	64	−32	25.8	3.40	10.0
Tiffin	58	−17	21.4	2.30	3.0
Upper Sandusky	59	−22	20.4	2.44	4.5
Urbana	58	−22	21.3	.....	.....
Vanceburg	61	−24	25.6	2.90	9.0
Vanwert	63	−18	22.4	1.70	0.5
Vermillion	57	−19	21.2	1.64	4.5
Vickery	61	−20	20.5	1.49	1.3
Walnut	.....	.....	.....	2.22	9.4
Warren	56	−20	21.2	2.04	8.9
Warsaw	60	−33	23.8	1.70	5.8
Wauseon	62	−17	21.0	4.52	2.1
Waverly	64	−29	24.2	3.37	14.1
Waynesville	57	−23	21.2	2.08	9.0
Wellington	59	−18	21.8	1.86	3.0
Westerville	59	−23	23.2	1.22	4.5
Willoughby	.....	.....	.....	1.75	4.0
Wooster	57	−21	20.5	1.64	4.5
Zanesville	....	.....	.....	2.32	12.5
Oklahoma.					
Anadarko	76	−17	30.0	0.18	.....
Arapaho	70	−14	25.3	T.	T.
Beaver	66	−25	22.4	0.32	3.2
Burnett	73	−17	29.6	0.39	0.5
Clifton	84	−19	27.7	0.36	0.2
Edmond	.....	−17	.....	0.53	1.0
Fort Sill	73	−14	29.5	0.20	.....
Guthrie	69	−17	26.6	0.26	T.
Hennessey	71	−17	26.8	0.45	T.
Hopeton	72	−19	24.6	0.23	1.7
Jefferson	70	−11	27.4	0.42	T.
Kingfisher	72	−15	28.2	0.30	T.
Mangum	75	−17	30.5	0.01	0.1
Newkirk	70	−22	25.4	0.57	T.
Norman	74	−17	29.0	0.25	
Pawhuska	70	−16	27.9	1.10	T.
Perry	72	−17	27.0	0.47	0.5
Prudence	73	.....	.....	0.21	
Sac and Fox Agency	73	−20	28.6	0.50	T.
Stillwater	71	−17	28.0	0.47	0.5
Waukomis	72	−18	27.5	0.33	T.
Winnview	70	−17	26.8	0.35	0.7
Oregon.					
Albany *a*	63	2	40.6	5.94	4.0
Albany *b*	.....	.....	.....	5.37	8.0
Arlington	64	− 3	33.7	1.23	3.5
Ashland *b*	59	0	38.4	1.77	0.7
Aurora *[1]	60	5	38.6	5.84	11.0
Aurora (near)	59	− 2	38.0	6.29	9.3
Bandon	56	18	44.9	7.50	3.5
Bay City	54	12	40.8	16.89	8.0
Beulah	51	−23	26.6	1.04	7.0
Blalock [d]	64	3	33.6	1.48	3.0
Brownsville *[1]	57	2	39.2	4.54	3.2
Burns	50	−24	24.6	0.80	3.0
Burns (near)	54	− 9	34.8	0.01	
Cascade Locks	54	4	35.4	13.93	9.0
Comstock *[1]	62	− 2	41.5	6.94	6.0
Coquille River	.....	.....	.....	7.88	3.5
Corvallis	59	− 5	38.0	5.61	3.2
Dayville	60	−10	31.9	1.80	5.6
Ella	.....	.....	.....	1.32	3.0
Eugene *a*	60°	0°	40.4°	.....	.....
Eugene *b*	.....	.....	.....	6.76	5.9
Fairview	59	20	44.0	10.66	8.0
Falls City	60	1	37.9	11.19	12.0
Forestgrove	59	− 1	35.8	7.08	7.3
Gardiner	56	16	43.6	11.74	3.0
Glenora	57	6	37.0	19.19	9.5
Government Camp	46	−16	26.0	22.22	110.0
Grants Pass *a*	65	10	41.2	3.60	2.8
Happy Valley	55	−22	28.0	1.57	5.3
Heppner	60	−13	32.1	1.96	8.5
Hood River (near)	56	− 6	33.3	5.89	18.5
Jacksonville	58	5	38.6	4.53	T.
Joseph	46	−24	22.2	2.10	21.0
Junction City *[1]	60	6	40.5	4.87	7.0
Kerby	64	8	40.4	7.14	3.4
Klamath Falls	56	0	33.2	1.67	9.0
Lafayette *[1]	60	2	37.9	4.72	13.0
Lagrande	54	−18	28.4	4.33	0.3
Lakeview [d]	51	−17	28.6	0.80	8.0
Langlois	62	16	46.8	9.91	6.0
Lonerock	60	−18	30.3	1.98	11.0
McMinnville	59	− 2	38.4	6.06	6.0
Merlin *[1]	64	6	37.0	4.02	6.0
Monmouth *a* *[1]	62	0	40.3	4.08	8.0
Monmouth *b*	59	− 6	39.5	.....	.....
Monroe	60	− 1	38.8	6.35	8.5
Mount Angel	58	−15	33.2	5.31	11.0
Nehalem	.....	.....	.....	20.79	5.2
Newberg	59	− 2	38.4	5.18	8.1
Newbridge	50	−11	27.5	1.79	19.5
Newport	54	12	41.4	12.59	
Pendleton	62	− 8	32.2	1.89	10.8
Placer	.....	.....	.....	7.00	12.0
Prineville	60	−17	30.7	0.60	T.
Riddles *[1]	65	14	41.2	4.20	3.5
Riverside	63	−13	31.2	1.25	5.0
Salem *b*	64	− 4	39.7	6.35	11.0
Sheridan *[1]	56	1	36.9	4.82	9.0
Silver Lake	62	−27	30.4	0.24	T.
Silverton *[1]	58	− 2	40.4	6.32	10.0
Siskiyou *[1]	60	2	37.5	3.00	30.0
Sparta	46	−15	22.6	3.80	38.0
Stafford	57	0	37.8	6.39	13.5
The Dalles	62	− 1	35.7	2.19	6.5
Toledo	56	8	41.4	14.80	6.0
Umatilla	.....	.....	.....	1.00	3.2
Vale	53	−12	27.7	1.10	7.0
Vernonia	59	2	37.0	6.81	10.0
West Fork *[1]	54	10	36.8	3.88	3.0
Weston	57	−15	28.7	5.61	15.9
Williams	68	4	39.5	4.05	4.5
Winona *[1]	74	4	38.5	7.85	8.0
Pennsylvania.					
Altoona	59	−20	21.3	3.33	.....
Aqueduct	56	−14	25.8	4.36	25.1
Athens	49	−18	20.6	2.84	20.4
Beaver Dam	.....	.....	.....	1.98	6.8
Brookville	.....	.....	.....	1.71	10.7
Browers Lock	.....	.....	.....	5.22	.....
Butler	55	−27	20.9	2.39	12.2
Cameron	.....	.....	.....	2.38	13.0
Carlisle	56	−15	23.2	5.49	30.5
Cassandra	55	−16	23.1	3.11	14.5
Cedarrun	.....	.....	.....	4.95	22.0
Centerhall	54	−19	21.2	4.54	27.5
Chambersburg	.....	.....	.....	4.86	31.8
Coatesville	59	−13	24.4	10.22	69.8
Confluence	62	−23	22.0	3.34	12.0
Coopersburg	64	−15	27.1	5.15	.....
Davis Island Dam	.....	.....	.....	2.85	9.0
Derry Station	62	−21	21.6	3.74	17.8
Driftwood	.....	.....	.....	1.65	8.0
Duncannon	.....	.....	.....	4.60	19.0
Dushore	56	−26	20.2	3.48	22.6
Dyberry	49	−20	18.5	3.97	22.0
East Bloomsburg	.....	.....	.....	3.70	21.5
East Mauch Chunk	59	−14	23.6	5.16	24.2
Easton	53	−12	24.4	3.41	26.5
Ellwood Junction	.....	.....	.....	1.52	7.6
Emporium	50	−28	21.4	3.66	18.3
Everett	60	−20	22.4	3.55	20.5
Farrandsville	.....	.....	.....	3.13	19.5
Forks of Neshaminy *[1]	52	−10	26.3	8.16	25.5
Frederick	.....	.....	.....	4.54	....
Freeport	.....	.....	.....	3.46	16.5
Girardville	.....	.....	.....	6.69	46.5
Grampian	48	−24	19.1	3.03	17.0
Greensboro	61	−30	25.8	3.60	17.4
Hamburg	56	−13	25.3	3.95	27.5
Hawley	55	−18	21.2	6.03	37.0
Hawthorn	53	−29	21.4	5.01	12.0
Hews Island Dam	.....	.....	.....	2.94	10.5
Huntingdon *a*	67	−23	23.8	3.96	18.5
Huntingdon *b*	.....	.....	.....	3.49	22.3
Indiana	60	−22	24.0	.....	.....
Irwin	.....	.....	.....	3.34	11.7
Johnstown	62	−17	25.4	3.49	13.5
Karthaus	.....	.....	.....	2.19	24.0
Keating	.....	.....	.....	2.60	11.7
Kennett Square	58	−13	25.1	8.04	46.0
Lansdale	.....	.....	.....	5.68	.....
Lawrenceville	53	−39	19.8	2.22	10.5
Lebanon	54	−16	23.3	5.16	30.1
Leroy	50	−20	19.2	3.05	22.5
Lewisburg	52	−22	21.6	4.57	26.5
Lock Haven *a*	60	−21	23.2	3.19	19.0
Lock Haven *b*	.....	.....	.....	1.28	5.6
Lock No. 4	.....	.....	.....	3.26	16.5
Lycippus	61	−22	21.8	3.91	18.2
Mifflin	.....	.....	.....	3.75	17.0
Nisbet	....	.....	.....	3.22	.....
Oil City	.....	.....	.....	2.61	9.8
Ottsville	.....	.....	.....	5.46	.....
Parker	.....	.....	.....	1.78	8.0
Philadelphia	59	− 6	27.8	6.46	31.2
Point Pleasant	.....	.....	.....	4.99	.....
Quakertown	54	−15	23.2	4.27	17.0
Reading [3]	.....	.....	23.5	3.85	.....
Reedsville	52°	−16°	18.6°	4.06	16.8
Renovo *a*	.....	.....	.....	2.08	13.0
Renovo *b*	54	−23	23.0	2.85	18.3
Ridgway	.....	.....	.....	1.85	13.5
Saegerstown	55	−24	20.3	2.03	5.4
St. Marys	.....	−22	.....	1.47	.....
Salem Corners	54	−18	20.8	6.63	46.2
Scranton	52	−15	22.6	6.30	24.0
Seisholtzville	.....	.....	.....	4.33	....
Selinsgrove	54	−22	22.4	4.87	31.0
Shawmont	.....	.....	.....	5.48	.....
Sinnamahoning	.....	.....	.....	2.86	14.2
Smethport	50	−26	19.6	2.85	13.0
Smiths Corners	.....	.....	.....	4.38	.....

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Somerset	56	−24	20.3	4.39	20.2
South Eaton	58	−14	22.4	3.58	22.0
State College	56	−20	21.2	3.42	15.1
Sunbury	.....	.....	.....	2.33	23.0
Swarthmore	54	− 9	25.7	7.10	35.0
Towanda	51	−17	21.2	2.52	19.0
Trout Run	.....	.....	.....	5.43	22.0
Uniontown	64	−22	25.6	4.51	19.5
Warren	50	−34	19.6	3.38	14.7
Wellsboro	56	−25	21.8	2.54	21.2
West Chester	55	−12	25.2	6.95	38.0
West Newton	.....	.....	.....	3.96	16.0
Westtown	52	−13	23.2	5.38	34.0
White Haven	53	−24	19.6	4.67	31.0
Wilkesbarre	52	− 9	25.2	4.48	30.0
Williamsport	54	−17	23.6	3.71	19.9
York	53	−17	22.8	6.64	47.1
Rhode Island.					
Bristol	47	0	25.7	5.08	28.0
Kingston	53	−10	23.5	5.08	24.5
Lonsdale	.....	.....	.....	3.82	26.0
Pawtucket	53	− 5	28.3	5.02	27.5
Providence *a*	52	− 2	26.4	6.00	35.2
Providence *c*	50	− 6	24.4	6.01	24.0
South Carolina.					
Allendale	.....	.....	.....	3.23	6.5
Anderson	.....	.....	.....	9.81	2.5
Batesburg	74	− 4	41.8	11.23	9.5
Beaufort	76	7	49.8	6.15	2.2
Blackville	79	− 3	45.2	6.53	4.1
Camden	.....	.....	.....	9.28	11.0
Central	73	− 8	39.0	8.09	4.5
Cheraw *a*	76	− 9	39.2	10.19	12.0
Cheraw *b*	.....	.....	.....	10.54	12.0
Clemson College	74	− 7	39.7	7.96	4.5
Conway	.....	.....	.....	6.11	8.0
Darlington	.....	.....	.....	4.99	8.0
Edisto	.....	.....	.....	4.97	9.0
Effingham	.....	.....	.....	5.18	10.0
Florence	76	− 1	44.0	6.58	8.0
Gaffney	.....	.....	.....	6.90	5.5
Georgetown	79	4	47.4	3.70	4.0
Gillisonville	80	0	48.6	5.30	3.8
Greenville	74	− 5	37.8	7.43	4.2
Greenwood	73	− 5	39.2	9.76	7.5
Holland	71	−10	38.9	10.53	8.0
Kingstree *a*	76	6	45.0	4.34	7.0
Kingstree *b*	.....	.....	.....	4.33	7.0
Little Mountain	76	− 4	42.0	8.09	7.5
Longshore	76	− 8	41.5	9.90	8.9
Mount Carmel	.....	.....	.....	9.83	9.0
Pinopolis *1	71	2	46.8	4.12	6.5
St. Georges	78	0	45.2	4.67	6.5
St. Matthews	80	0	43.3	7.10	7.0
St. Stephens	.....	.....	.....	4.23	7.1
Santuck	72	−11	39.4	8.51	7.2
Shaws Fork	75	−11	43.2	7.48	4.5
Smiths Mills	.....	.....	.....	4.10	6.0
Society Hill	74	0	42.0	10.21	10.0
Spartanburg	72	− 4	36.5	7.51	5.0
Statesburg	77	3	44.7	7.78	14.7
Summerville	80	0	48.0	5.43	5.0
Temperance	78	− 8	42.1	6.13	9.0
Trenton	74	− 4	45.6	12.30	9.0
Trial	77	− 3	44.4	5.48	8.0
Walhalla	73	− 9	38.0	6.51	5.0
Winnsboro	73	− 3	40.6	8.67	13.0
Yemassee	78	4	47.8	6.01	3.0
Yorkville	77	− 3	40.8	8.71	6.9
South Dakota.					
Aberdeen	56	−35	4.5	0.04	0.4
Alexandria	62	−38	7.6	T.	T.
Armour	61	−37	6.6	0.28	3.5
Ashcroft	52	−40	8.4	0.35	3.5
Bowdle	.....	−39	.....	0.25	2.5
Brookings	55	−41	5.0	0.21	2.1
Canton	.....	.....	.....	0.32	3.7
Centerville	.....	.....	.....	0.69	8.3
Chamberlain	63	−36	12.4	0.30	3.0
Chandler	62	−35	8.0	0.15	3.0
Clark	.....	.....	.....	0.19	1.9
Desmet	55	−40	4.8	0.40	4.0
Doland	57	−47	4.9	0.32	4.0
Elkpoint	60	−34	10.5	0.92	11.5
Farmingdale	.....	.....	.....	0.19	.....
Flandreau	56	−38	7.7	1.11	9.2
Forestburg	58	−46	4.6	0.32	3.2
Forest City	55	−34	5.6	0.30	3.0
Fort Meade	52	−30	6.4	0.46	3.6
Gann Valley	61	−42	7.8	0.20	2.0
Gary	.....	−35	.....	0.60	6.0
Goudyville	56	−39	4.4	0.10	1.0
Harney	56	−44	9.2	0.19	T.
Highmore	56	−40	2.0	0.15	1.5
Hotch City	63	−41	6.6	0.28	2.8
Hot Springs	52	−41	7.8	0.42	4.0
Howard	51	−42	5.4	0.60	6.0
Interior	60	−38	11.3	0.30	1.0
Ipswich	54	−37	4.5	0.05	0.5
Kimball	61	−38	8.2	0.28	2.8
Leslie	61	−41	6.7	0.25	2.5
Mellette	56	−39	8.0	T.	T.
Menno	62	−35	8.0	0.40	4.0
Millbank	55	−34	7.4	0.27	2.7
Mitchell	62	−39	8.1	0.17	1.7
Montrose	57	−40	4.2	0.34	3.2
Nowlin	62	−41	7.6	0.22	2.1
Oelrichs	52	−41	8.7	1.05	10.5
Parker	58	−37	6.8	0.55	5.5
Plankinton	62	−40	6.4	0.20	1.5
Redfield	59	−40	6.7	0.16	3.2
Rochford	50	−42	8.6	0.85	8.5
Rosebud	51	−35	6.6	0.60	6.0
Silver City	.....	.....	.....	0.52	5.2
Sioux Falls	57	−42	5.2	0.65	6.5
Spearfish	51	−29	8.2	0.19	3.7
Tyndall	62	−33	7.6	0.35	3.5
Watertown	47	−38	3.9	T.	T.
Waubay	54	−36	2.1	.....	.....
Wentworth	56	−40	5.0	0.68	6.8
Wessington Springs	50	−39	4.0	0.65	6.5
Whiteswan	63	−29	10.9	0.34	3.4
Wolsey	.....	.....	.....	0.10	1.0
Tennessee.					
Andersonville	64	−14	31.2	8.25	11.0
Ashwood	71	−14	33.0	7.73	7.0
Benton (near)	68	−16	34.6	5.79	3.0
Bluff City	.....	.....	.....	7.21	9.5
Bristol	60	−20	29.6	4.91	3.0
Byrdstown	66	−19	29.8	6.61	7.5
Carthage	69	−15	30.7	6.52	.....
Charleston	.....	.....	.....	9.11	3.4
Clarksville	69	−14	28.5	5.86	13.5
Clinton	.....	.....	.....	8.10	6.0
Decatur	66	−13	33.6	7.53	7.0
Dover	69	−18	28.4	4.72	6.2
Elizabethton	65	−17	31.6	6.07	10.5
Elk Valley	63	−19	28.6	7.00	8.0
Erasmus	67	−30	29.9	6.91	4.1
Florence	68	−16	30.6	8.48	5.0
Franklin	69	−15	30.6	6.57	2.8
Grace *1	70	−20	32.0	6.70	13.0
Greeneville	63	−14	31.8	6.62	4.0
Harriman	64	−12	31.6	8.38	3.0
Hohenwald	70	−15	31.4	6.88	4.5
Jackson	66	−13	31.1	.....	.....
Johnsonville	70	−23	30.1	4.44	7.0
Jonesboro *1	58	−15	32.2	6.34	7.2
Kingston	.....	.....	.....	7.13	4.0
Lafayette *5	62	−18	28.0	4.08	5.5
Lewisburg	64	−14	31.3	6.36	9.0
Lynnville	71	−13	31.8	8.11	6.0
McMinnville	71	−26	31.2	5.22	8.8
Madison	76	−23	29.9	7.27	6.8
Maryville *5	66	−11	33.0	7.55	6.3
Newport	65	−16	33.6	7.29	6.0
Nunnelly	70	−18	31.0	6.31	3.0
Oak Hill	70	−27	32.3	14.15	14.4
Palmetto	72	−18	32.4	5.56	9.0
Peryear *5	60	−16	28.2	2.95	8.0
Pope	68	−20	29.9	4.53	4.5
Rogersville	63	−17	31.2	5.97	8.6
Rugby	64	−19	28.4	8.67	7.0
St. Joseph	67	−13	31.9	2.66	2.8
Savannah	72	− 8	33.2	5.32	.....
Sewanee	65	−11	33.9	8.99	5.0
Silverlake	56	−16	29.7	6.84	8.0
Springdale	65	−24	31.7	5.99	6.0
Springfield	71	−22	28.6	5.35	8.5
Sylvia	69	−20	29.8	4.77	2.5
Tazewell	.....	.....	.....	6.69	13.1
Tellico Plains	68	−15	35.1	9.56	8.5
Tracy City	65	−19	30.3	9.36	10.0
Trenton	66	−29	29.4	3.64	10.0
Tullahoma	69	−20	32.2	6.75	7.3
Union City	62	−16	26.5	2.70	16.0
Waynesboro	70	−15	31.7	4.76	2.3
Wildersville	67	−18	32.2	6.36	5.8
Yukon	71	−16	33.1	7.88	7.1
Texas.					
Albany *1	68	− 8	35.9	.....	
Alvin	.....	.....	.....	2.56	
Anna	78	−11	36.6	0.65	0.5
Anson	83	−11	37.9	T.	T.
Austin *a*	76	− 1	39.5	0.91	
Austin *b* *5	78	− 5	38.8	.....	
Ballinger	78	− 2	35.4	T.	
Beaumont	77	4	49.6	2.00	
Beeville	93	5	45.8	0.90	
Blanco	84	− 6	40.6	0.60	
Boerne *1	80	0	42.5	0.45	T.
Brazoria	80	6	48.0	3.58	T.
Breckenridge	79	− 9	34.0	0.10	1.0
Brenham	81	0	42.0	1.17	0.1
Brighton	80	7	49.8	0.56	
Brownwood	.....	.....	.....	T.	
Burnet *1	72	− 3	40.4	0.31	
Camp Eagle Pass	.....	7	.....	0.00	
Coleman	74	− 6	34.6	T.	T.
College Station *2	.....	.....	41.0	1.22	
Colorado	.....	.....	.....	T.	
Columbia	79	5	46.4	2.18	T.
Conroe	81	2	44.6	1.35	0.2
Corsicana	72	− 7	36.8	1.24	3.0
Cuero	.....	.....	.....	1.00	
Dallas	77	−10	33.6	0.38	1.0
Danevang	81	3	46.8	1.36	T.
Dublin	77	− 9	33.0	0.05	T.
Duval	81	− 5	43.4	.....	.....
Emory	.....	.....	.....	1.60	1.8
Fort Brown	90	12	54.6	1.09	
Fort McIntosh	97	5	55.8	0.00	
Fort Ringgold	99	7	52.6	0.08	
Fredericksburg *1	83	− 1	41.1	0.27	T.
Fruitland	80	−12	33.5	0.17	T.
Gainesville	74	−12	34.5	0.54	0.4
Georgetown *1	76	− 2	38.4	0.51	
Golindo	.....	.....	.....	0.80	T.
Grapevine	80	−12	35.6	0.87	1.6
Hale Center	77	− 8	36.4	T.	T.
Hallettsville	85	5	44.8	0.57	
Hewitt	.....	.....	.....	1.00	T.
Honeygrove	.....	.....	.....	0.21	1.0
Houston	78	6	45.4	3.03	T.
Hulen	79	7	48.5	2.53	
Huntsville	78	− 2	40.4	1.83	T.
Jacksonville	76	− 5	41.0	1.79	1.5
Jasper	80	3	44.6	2.30	2.5
Kent	.....	.....	.....	0.04	0.5
Kerrville	84	− 2	38.8	0.25	T.
Lampasas	81	− 2	38.1	0.25	
Langtry	.....	.....	.....	0.00	
Llano *5	81	− 4	42.7	T.	T.
Longview	73	− 7	37.4	1.40	.....
Luling	83	2	42.5	0.58	T.
Mann	78	− 6	34.8	1.35	
Marshall	72	− 9	39.8	2.53	5.0
Mount Blanco	75	−14	30.7	0.00	
New Braunfels	84	2	44.0	0.46	
Paris *1	64	−12	35.6	.....	.....
Point Isabel *1	84	20	58.1	0.60	
Rheinland	79	−10	34.2	0.01	T.
Rockport *1	72	10	49.6	.....	
Runge	91	6	47.5	0.44	
Sabine Pass	75	8	49.2	2.29	
San Antonio	91	4	47.4	0.30	
Sanderson	79	2	35.3	.....	.....
San Marcos	79	1	38.4	0.45	.....
Sugarland	.....	.....	.....	1.90	
Sulphur Springs	76	−10	38.0	0.91	2.5
Temple *a*	78	− 4	39.0	0.97	T.
Temple *b*	75	− 4	39.2	0.69	.....
Topaz	76	− 8	35.0	0.06	0.4
Tulia	70	−23	29.4	0.10	1.0
Tyler	64	− 8	33.0	0.90	1.5
Victoria	.....	.....	.....	0.43	
Waco	76	− 5	36.7	1.10	
Waxahachie	76	− 9	36.4	1.30	2.0
Weatherford	78	−11	33.7	0.51	0.8
Wichita Falls	.....	.....	.....	0.20	
Utah.					
Alpine	.....	.....	.....	4.29	.....
Blue Creek *1	48	−13	25.2	1.40	14.0
Brigham	.....	.....	.....	1.73	.....
Cisco	58	−23	23.0	0.85	8.5
Corinne	50	−13	28.0	0.80	8.0
Croydon	60	−34	24.9	2.95	29.5
Fillmore	59	−17	32.0	1.40	.....
Fort Duchesne	55	−19	23.7	0.40	4.0
Frisco	58	− 9	32.4	0.65	6.0
Giles	67	− 2	33.7	T.	
Grover	57	−20	31.6	0.15	1.5
Heber	46	−38	20.0	5.85	58.5
Huntsville	.....	.....	.....	3.99	31.0
Kelton *1	47	−27	22.9	0.50	5.0
Levan	53	−23	26.3	2.25	21.0
Loa	53	−24	24.0	0.48	4.8
Logan	42	−19	24.6	0.73	.....
Manti	48	−25	25.6	2.00	18.0
Marysville	.....	.....	.....	1.96	19.6
Millville	.....	.....	.....	1.95	.....
Minersville	60	−15	32.0	0.38	3.5
Moab	68	0	35.6	0.15	0.5
Mount Pleasant	52	−23	27.6	3.60	36.0
Ogden *a* *1	54	−14	29.6	1.98	19.8
Pahreah	65	0	38.2	0.80	8.0
Parowan	58	−16	31.2	1.10	11.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pinto	56	2	29.5	0.35	0.5
Promontory [1]	51	2	25.6	0.50	5.0
Provo	53	−17	29.8	2.89	.....
Richfield	70	−20	31.2	0.55	5.5
St. George	77	1	42.2	T.	T.
Scipio	52	−39	28.4	.....	.....
Snowville	46	−18	24.9	1.28	12.0
Soldier Summit	.....	.....	.....	3.80	38.0
Terrace [1]	42	−12	19.1	0.80	8.0
Thistle	49	−25	24.2	2.40	24.0
Tooele	51	− 9	30.2	1.29	.....
Tropic [f]	67	5	32.4	T.	
Vernal	53	−14	25.6	0.55	5.3
Vermont.					
Bennington	51	−18	20.8	3.88	20.0
Brattleboro	50	−10	22.1	3.21	35.0
Burlington	47	−10	21.0	1.34	12.0
Chelsea	50	−18	15.8	1.95	21.0
Cornwall	50	−14	19.2	2.28	23.0
Derby	51	−22	14.6	2.03	19.0
Enosburg Falls	48	−21	16.7	2.18	18.0
Hartland	49	−22	17.0	2.49	24.7
Jacksonville	47	−18	16.2	3.10	24.8
Norwich	52	−23	16.5	2.59	20.5
St. Johnsbury	47	−29	15.2	2.76	33.0
Vernon [e]	45	−13	20.7	3.68	30.0
Wells	47	−18	17.7	1.87	17.5
Woodstock	44	−30	14.7	2.70	33.5
Virginia.					
Alexandria	60	−12	27.6	6.09	30.3
Ashland	67	− 6	31.1	4.60	17.8
Barboursville	63	−15	29.4	5.65	34.0
Bedford City	63	− 6	31.6	.....	11.5
Bigstone Gap	62	−10	30.1	6.32	9.5
Birdsnest [1]	73	1	33.4	4.80	13.0
Blacksburg	58	−11	27.4	6.43	12.0
Buckingham	.....	.....	.....	5.61	16.0
Burkes Garden	54	−15	27.0	7.71	10.0
Callaville	68	− 2	33.2	6.11	17.5
Christiansburg	.....	.....	.....	4.97	11.5
Clarksville	.....	.....	.....	5.82	36.0
Clifton Forge	55	− 4	28.0	4.29	19.0
Colemans Falls	64	− 8	31.6	5.69	13.0
Columbia	.....	.....	.....	2.30	18.0
Dale Enterprise	58	−22	23.4	5 57	46.5
Doswell	65	−10	24.6	4.68	34.0
Dwale	.....	.....	.....	5.09	16.0
Farmville	61	− 8	31.6	6.14	22.5
Fredericksburg	63	−21	28.2	6.79	35.0
Grahams Forge	58°	−12°	27.6°	4.81	12.7
Hampton	67	4	36.0	8.18	15.0
Hot Springs	56	−14	25.4	5.36	13.0
Leesburg	58	−10	26.6	3.33	27.0
Lexington	58	− 9	27.2	5.41	21.8
Manassas	60	−21	27.2	5.65	34.5
Marion	62	−15	30.6	6.53	5.0
Miller School	63	−15	29.5	3.52	21.8
Monterey	50	−29	24.1	2.65	36.5
Newport News	64	3	35.6	5.41	19.0
Petersburg	65	− 3	33.2	5.57	21.5
Quantico	56	−20	24.4	.....	18.0
Radford	.....	.....	.....	4.03	10.0
Richmond (near)	67	− 5	33.0	5.85	23.7
Rockymount	63	− 2	32.0	5.64	8.0
Salem	67	− 2	33.4	6.09	12.0
Speers Ferry	.....	.....	.....	6.25	6.0
Spottsville	71	− 6	34.0	6.99	22.4
Stanardsville	65	−12	28.6	4.43	22.0
Staunton	58	−12	27.0	4.89	40.0
Stephens City	57	−17	25.2	4.91	39.0
Sunbeam	73	− 3	37.0	6.90	15.0
Tobaccoville	.....	− 6	.....	6.50	26.0
Warrenton	58	− 9	28.6	7.67	54.0
Warsaw	.....	.....	.....	3.79	23.0
Westbrook	65	− 3	31.7	.....	...
Westpoint	69	2	32.2	7.15	26.2
Williamsburg	58	2	32.4	.....	.....
Woodstock	52	−23	24.0	3.99	43.5
Wytheville	61	− 9	29.5	4.44	10.0
Washington.					
Aberdeen	53	13	38.2	12.45	5.5
Anacortes	.....	.....	.....	4.91	9.0
Ashford	.....	.....	.....	11.04	20.0
Blaine	53	− 3	31.2	5.84	7.0
Brinnon	54	10	37.0	3.95	11.5
Cedar Lake	.....	.....	.....	19.04	19.0
Cedonia	48	−24	19.0	1.38	15.0
Centerville	63	−17	30.2	1.93	11.5
Clearwater	50	11	37.6	20.97	19.4
Cle Elum	54	−13	29.1	7.04	53.0
Colfax	55	−14	27.4	3.32	23.9
Coupeville	57	6	38.2	4.92	24.0
Dayton	56	−12	28.8	5.24	27.0
Ellensburg	58	− 6	28.1	1.68	16.8
Ellensburg (near)	54	− 8	27.6	1.47	19.0
Fort Simcoe	63	− 8	31.0	0.92	8.0
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Spokane	53	−24	21.4	0.90	9.0
Grandmound	56	3	38.2	6.81	3.2
Hooper	57	− 7	28.0	2.59	10.6
Kennewick	63	− 6	32.2	1.22	8.8
Lacenter	56	9	37.0	9.33	8.0
Lakeside	57	− 3	26.8	1.32	8.0
Lind	56	−33	25.6	1.31	14.5
Loomis [c]	54	−11	25.2	0.50	5.0
Madrone [f]	56	6	36.4	2.69	12.0
Mayfield	60	5	35.4	6.71	.....
Montecristo	49	− 3	29.4	15.07	81.2
Moxee Valley	61	−10	29.8	0.44	2.8
New Whatcom	54	8	37.1	3.95	6.2
Northbend	52	9	33.8	11.06	12.0
Olga	53	10	37.2	3.92	8.0
Olympia	56	5	39.0	5.99	9.0
Orcas Island	53	8	38.4	3 74	10.0
Pinehill	60	−11	33.0	3.60	14.4
Pomeroy	50	−12	30.3	6.31	28.2
Port Townsend	57	10	38.8	2.56	5.6
Pullman	49	−18	25.0	2.50	25.0
Rosalia	46	−11	23.4	1.64	10.7
Sedro	53	9	34.8	8.42	7.0
Shoalwater Bay [10]	50	12	40.2	.....	.....
Silvana	54	3	34.8	8.51	23.0
Snohomish	52	5	36.8	6.37	9.0
Southbend	52	12	40.2	12.88	0.2
Sunnyside	61	− 6	30.0	0.50	3.6
Tunnel	36	10	25.6	22.80	226.0
Union City	54	11	38.0	7.31	11.5
Usk	48	−36	17.8	1.00	7.0
Vancouver	60	6	38.8	4.39	7.0
Vashon	54	9	38.1	4.20	8.0
Waterville	58	−14	22.5	1.25	12.5
Wilbur	44	−22	23.5	3.37	33.7
West Virginia.					
Beckley	.....	.....	.....	4.03	23.0
Beverly	67	−18	26.0	4.87	30.0
Bluefield	59	−14	28.4	6.43	12.1
Buckhannon *a*	.....	.....	.....	5.02	27.5
Buckhannon *b*	62	−31	24.9	.....	.....
Burlington	58	−17	23.3	4.30	30.0
Charleston	.....	.....	.....	4.81	18.5
Dayton	65	−35	25.4	4.28	12.0
Eastbank	60	−17	26.8	5.68	21.0
Elkhorn	61	−12	29.6	6.09	9.3
Fairmont	.....	.....	.....	3.34	16.7
Glenville	62	−29	24.2	4.51	20.2
Grafton	64	−27	26.4	3.43	13.5
Green Sulphur	60	−16	27.8	5.51	14.5
Hamlin	65	−27	26.8	4.60	26.0
Harpers Ferry	.....	.....	.....	4.80	34.6
Hinton *a*	.....	.....	.....	4.88	15.0
Hinton *b*	61	−12	28.4	.....	.....
Huntington	63	−24	26.6	5.53	21.5
Kingwood	62	−33	24.6	4.20	18.4
Marlinton	57	−23	26.4	5.32	27.5
Martinsburg	55	−13	28.5	4.35	29.0
Morgantown	65	−25	26.0	5.67	12.8
New Cumberland	61	−23	18.8	2.25	12.0
New Martinsville	61	−25	26.6	2.81	12.5
Nuttallburg	63	−21	27.6	4.50	26.0
Oldfields	59	−25	23.0	4.43	26.0
Parsons	61	−18	26.8	4.24	21.0
Philippi	66	−28	26.4	4.87	25.0
Point Pleasant	69	−26	25.9	2.93	8.0
Powellton	66	−20	28.8	4.52	15.3
Romney	56	−11	25.4	3.34	27.0
Rowlesburg	.....	.....	.....	3.30	23.0
Upper Tract	66	−28	27.2	4.21	29.2
Weston *a*	.....	.....	.....	3.72	27.0
Weston *b*	64	−30	26.8	.....	.....
Wheeling *a*	.....	.....	.....	3.18	14.2
Wheeling *b*	63	−16	27.2	2.86	12.0
Wisconsin.					
Amherst	42	−48	5.8	1.10	11.0
Antigo	43	−40	5.6	0.80	8.0
Barron	50	−48	6.0	1.16	11.0
Bayfield	48	−33	7.3	1.20	12.0
Brodhead	54	−25	14.8	0.70	4.5
Butternut	58	−43	8.3	1.35	13.6
Chilton	48	−34	10.8	0.45	4.0
Citypoint	47	−36	8.2	0.96	9.5
Dodgeville	49	−31	10.0	2.51	21.1
Easton	46	−50	6.2	0.85	8.8
Eau Claire	44	−40	6.1	1.47	14.2
Florence	44	−39	7.2	0.35	3.5
Fond du Lac	48	−30	8.9	0.97	6.1
Grand River Locks	.....	.....	.....	0.65	7.5
Grantsburg	45	−42	6.9	1.57	15.2
Gratiot	52	−27	12.5	0.80	8.0
Hartford	53	−27	13.2	1.18	5.5
Hartland	51	−24	14.0	0.84	4.0
Harvey	51	−24	14.2	0.68	3.9
Hayward	49	−45	5 0	0.89	6.4
Heafford Junction	46	−39	6.2	0.75	7.5
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hillsboro	48	−40	8.6	1.50	15.0
Knapp	44	−48	4.9	0.60	6.0
Koepenick [1]	46	−30	8.3	1.00	10.0
Lancaster	48	−29	9.0	1.19	10.0
Madison	49	−28	11.9	0.42	5.0
Manitowoc	47	−29	12.1	0.98	4.5
Meadow Valley	45	−44	5.2	0.70	10.0
Medford	45	−45	5.0	0.80	8.0
Menasha	.....	.....	.....	0.41	5.2
Neillsville	46	−46	4.6	1.11	8.0
New Holstein	46	−32	11.8	1.00	10.0
New London	46	−37	8.5	1.13	6.5
Oconto	48	−30	10.8	0.65	6.5
Osceola	50	−47	3.5	0.52	13.0
Oshkosh	48	−33	12.1	0.55	.....
Pepin	46	−42	5.7	0.80	10.0
Pine River	48	−36	8.8	1.13	11.5
Portage	48	−27	11.8	0.52	6.0
Port Washington	56	−29	15.4	0.70	1.0
Prairie du Chien	52	−21	18.0	1.59	12.5
Prentice [1]	44	−34	5.8	1.01	8.1
Racine	55	−21	17.8	T.	T.
Sharon	52	−26	12.6	1.13	9.0
Shawano	49	−39	9.0	1.20	11.0
Spooner	55	−45	6.2	1.60	16.0
Stevens Point	47	−48	6.2	0.90	9.0
Sturgeon Bay Canal [9]	42	−35	10.0	.....	.....
Valley Junction	46	−44	6.8	1.34	12.5
Viroqua	45	−31	9.0	2.10	21.2
Watertown	50	−27	12.8	0.45	4.5
Waukesha	49	−26	13.4	0.77	3.8
Waupaca	43	−38	7.8	1.25	13.0
Wausau	44	−40	7.0	1.15	11.5
Wausaukee	48	−33	9.4	0.60	6.0
West Bend	50	−26	13.8	T.	T.
Westfield	48	−35	10.4	1.00	10.0
Whitehall	44	−26	6.0	1.20	12.0
Wyoming.					
Alcova	49	−34	13.2	0.13	1.3
Basin	43	−51	2.2	3.56	35.6
Big Piney	42	−36	11.6	0.40	4.0
Binford [1]	.....	.....	12.5	1.61	16.1
Bitter Creek	55	−33	21.4	0.80	8.0
Burns	45	−38	10.0	2.30	23.0
Carbon	39	−23	14.1	2.85	30.1
Centennial	44	−34	13.2	5.90	59.0
Cody	55	−46	5.7	2.20	22.0
Dome Lake	32	−23	9.8	0.90	9.0
Evanston	42	−30	16.1	2.10	21.0
Fort Laramie	50	−48	6.4	0.95	11.9
Fort Washakie	55	−35	9.6	0.35	3.5
Fort Yellowstone	43	−35	10.8	3.40	34.0
Four Bear	50	−40	11.5	0.43	6.5
Hecla	49	−24	17.7	1.56	23.3
Laramie	43	−40	9.4	1.13	11.3
Lovell	.....	−51	.....	.....	.....
Lusk	45	−35	7.8	1.35	13.5
Rawlins	39	−30	12.8	1.40	14.0
Sheridan	47	−45	5.2	1.52	15.2
Sherman	.....	.....	.....	5.40	54.0
Sundance	49	−39	4.9	0.90	9.0
Thayne	44	−41	19.6	2.20	22.4
Wamsutter	43	−36	17.2	0.90	9.0
Wheatland	47	−28	9.2	1.55	15.5
Mexico.					
Ciudad P. Diaz	88	12	50.0	0.03	
Coatzacoalcos [2]	.....	.....	72.4	.....	
Leon de Aldamas	78	30	57.3	0.00	
Puebla	75	34	54.1	0.00	
Tampico [2]	.....	.....	61.9	.....	
Vera Cruz [2]	.....	.....	67.0	.....	
Porto Rico.					
Ponce [1]	84	68	74.2	.....	
Puerta de Tierra	87	66	75.0	1.00	

Late reports for December, 1898.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.					
Madison Station	69	8	38.6	.....	
California.					
Chino	.....	.....	.....	0.44	
Crescent City L. H.	.....	.....	.....	6.02	
Kono Tayee	61	29	44.2	1.27	
Mutah Flat	.....	.....	.....	0.40	
Point George L. H	.....	.....	.....	2.79	
San Miguel Island	78	38	53.8	1.16	
Sneddens Ranch	.....	.....	.....	0.30	
Tejon Ranch	72	30	48.1	0.87	
Yuba City [5]	58	32	43.5	1.42	
Georgia.					
Cartersville	.....	.....	.....	0.60	
Diamond	.....	.....	.....	2.35	1.0
Illinois.					
St. John	.....	.....	.....	2.87	2.2

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa.	°	°	°	*Ins.*	*Ins.*
Albia	.....	— 12	21.0	.....	.....
Monticello	.....	.....	.....	0.53	5.3
Northwood	.....	.....	.....	T.	T.
Kansas.					
Hays	58	— 6	28.7	2.10	7.0
Wellington	62	3	33.0	2.25	5.0
Louisiana.					
Venice	77	32	52.0	4.55	
White Sulphur Springs	.....	.....	.. ...	3.02	4.0
Maine.					
Petit Menan *[1]	45	—12	28.7	.....	.....
Michigan.					
Owosso [c]	42	4	25.6	1.35	3.0
Montana.					
Canyon Ferry	45	—15	17.0	.....	.....
Nebraska.					
Ord	.....	.....	.....	0.43	.....
Palmer	.....	.....	.....	T.	.....
Syracuse	.....	... ..	.....	1.04	7.5
Nevada.					
Candelaria	68	4	35.4	0.28	2.8
Carlin	.....	.....	.....	0.17	0.2
New York.					
Rome	45	—14	22.3	3.47	.....
North Carolina.					
Springhope *[1]	65	19	41.2	3.20	
Ohio.					
Bement	.....	.....	.....	1.87	6.1
Cleveland *b*	.....	.....	.....	2.17	3.3
Hudson	.....	.....	.....	2.72	8.5
Somerset	58	—16	31.5	.....	.....
Oregon.					
Burns (near)	52	— 4	25.4	.....	.....
South Dakota.					
Millbank	50	—18	17.6	T.	T.
Tennessee.					
Jackson	66[b]	10[b]	39.4[j]	3.35	.....
Texas.					
College Station [g]	75[e]	18[e]	44.4[e]	6.44	5.0
Vermont.					
Jacksonville	.....	.....	.....	5.24	.. ...

Late reports for January, 1899.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.					
Coal Harbor	45	— 6	26.2	3.30	0.8
Kodiak	51	— 1	30.3	4.82	.....
Delaware.					
Wyoming	59	5	33.0	4.36	T.
Iowa.					
Toledo	45	—18	20.0	0.13	.....
Kansas.					
Eureka	.....	.....	.....	T.	T.
Louisiana.					
Sugar Experiment Sta.	75	30	51.4	2.90	
Montana.					
Lewiston [f]	48	—15	22.0	0.40	1.0
Nevada.					
Elko *[1]	48	— 2	31.5	1.35	9.5
Elko (near)	62	—11	30.3	1.79	7.0
Empire Ranch	45	—12	20.7	0.46	13.0
Humboldt *[1]	58	15	37.4	0.25	1.5
Lovelocks *[1]	60	4	33.8	0.60	6.0
Mills City *[1]	56	11	35.7	0.15	1.5
Reno *[1]	65	12	34.4	1.15	11.5
New Mexico.					
Deming *[1]	70	17	39.5	.....	.....
Oregon.					
Monmouth *a* *[1]	55	28	40.8	5.86	
South Dakota.					
Hot Springs	53	—17	20.2	0.81	1.5
Utah.					
Cisco	45	.....	.....	0.90	9.0
Wyoming.					
Lovell	.....	.....	.....	2.70	27.0

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[8] Mean of 7 a. m. + 2 p. m. + 9 p. m. ÷ 3.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "[b] a" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

January, 1899, Carlin, Nev., make mean temperature 25.5° instead of 33.4°.

January, 1899, Witts Springs, Ark., make mean temperature 35.6° instead of 34.8°.

NOTE.—The following changes have been made in names of stations:

California, Lime Kiln changed to Lemoncove.
New York, Lake George changed to Caldwell.

TABLE III.—*Mean temperature for each hour of seventy-fifth meridian time, February*, 1899.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	−1.0	−2.3	−3.0	−3.5	−4.1	−4.5	−4.6	−4.9	−5.9	−5.0	−2.2	1.7	4.8	7.1	8.7	9.4	9.7	9.5	8.1	5.9	3.3	2.0	0.9	−0.1	1.2
Boston, Mass	23.8	23.3	23.0	22.7	22.5	22.3	22.5	23.5	24.8	26.3	28.1	29.7	30.9	31.9	32.1	31.3	30.1	28.8	27.5	26.9	26.2	25.9	25.5	25.2	26.5
Buffalo, N. Y.....	19.2	19.3	19.0	18.8	18.4	18.1	18.2	18.4	19.1	20.1	21.4	22.6	23.1	23.4	23.8	24.1	24.0	23.0	22.7	22.3	22.0	21.5	21.1	20.3	21.0
Chicago, Ill.....	16.7	16.1	15.3	14.7	14.5	13.9	13.6	13.7	13.4	14.4	15.7	17.6	18.9	19.9	20.9	21.5	21.8	21.4	20.9	20.4	19.5	18.9	18.3	17.7	17.5
Cincinnati, Ohio....	21.9	21.6	21.1	20.9	20.5	20.2	20.1	20.8	20.9	21.9	23.5	25.3	26.9	28.0	28.9	29.6	29.8	29.6	28.7	27.5	26.6	25.6	24.6	24.0	24.5
Cleveland, Ohio	19.6	19.2	18.9	18.5	17.9	17.9	17.7	17.6	18.6	19.5	20.9	22.4	23.5	24.1	24.2	23.9	23.7	23.1	22.5	22.6	21.8	21.6	21.5	21.0	20.9
Detroit, Mich.....	17.3	16.9	16.6	16.2	16.2	15.9	15.9	15.7	16.2	17.6	19.2	20.6	22.6	23.6	24.0	24.3	23.9	23.2	22.2	21.1	20.1	19.3	18.7	18.4	19.4
Dodge, Kans.....	15.0	14.8	14.5	13.6	13.1	12.4	11.5	11.2	11.1	13.2	16.6	20.8	24.4	26.9	28.6	29.5	30.2	29.9	28.1	23.6	20.8	19.2	17.6	16.8	19.3
Eastport, Me.....	18.9	18.6	18.3	18.0	17.5	17.3	17.0	16.9	17.5	18.3	19.9	21.3	22.4	23.0	23.6	23.8	23.3	22.5	22.0	21.9	21.5	21.2	20.6	20.2	20.2
Galveston, Tex.....	47.2	47.1	46.7	46.5	46.3	46.2	45.9	46.0	45.9	46.8	47.8	48.8	49.6	50.4	51.0	51.4	51.4	50.8	49.6	49.5	48.9	48.7	48.9	48.4	48.3
Havre, Mont.....	1.6	1.3	1.1	0.9	0.8	0.7	0.3	0.4	−0.9	−0.4	0.6	2.0	3.4	4.7	6.0	6.5	7.1	7.2	7.1	5.8	4.9	4.1	3.8	3.3	3.0
Kansas City, Mo.....	18.0	17.6	16.9	16.0	15.6	14.6	14.1	13.6	13.2	14.1	16.0	18.4	20.5	22.4	24.3	25.2	25.9	25.6	24.5	23.2	22.0	21.2	20.4	19.4	19.3
Key West, Fla.....	68.2	68.2	68.0	67.7	67.7	67.5	67.3	67.5	69.1	70.1	71.0	72.0	72.7	73.0	72.7	72.2	71.5	70.4	69.7	69.7	69.2	68.7	68.5	68.2	69.6
Marquette, Mich	8.1	7.8	7.4	7.0	6.6	6.4	6.1	5.8	5.7	7.2	9.6	11.2	12.5	13.5	14.0	14.5	14.2	13.6	12.3	11.4	10.8	10.0	9.5	9.1	9.8
Memphis, Tenn.....	30.4	30.0	29.2	28.9	28.2	27.9	27.4	27.0	27.4	28.2	29.6	31.6	33.2	34.4	35.5	36.4	37.3	37.2	35.9	35.5	34.5	34.1	33.2	32.6	31.9
Mt. Tamalpais, Cal..	46.2	45.9	45.9	45.7	45.2	44.7	44.3	44.8	44.2	44.4	45.0	45.5	47.0	48.0	49.5	50.7	51.2	51.2	49.3	48.3	47.2	46.7	46.9	46.9	46.9
New Orleans, La.....	47.0	46.5	46.1	45.6	45.2	44.9	44.6	44.6	44.7	46.1	48.2	49.9	51.4	52.2	53.1	53.4	53.9	53.5	52.7	51.6	50.3	49.4	48.6	48.1	48.8
New York, N. Y.....	24.9	24.5	24.2	24.0	23.5	23.2	23.5	24.3	25.2	26.3	27.1	28.2	29.1	29.7	30.3	30.3	29.5	29.1	28.7	28.6	27.6	27.0	26.3	26.0	26.7
Philadelphia, Pa.....	26.3	25.9	25.5	25.0	24.6	24.2	24.1	24.2	25.2	26.2	27.7	28.9	29.6	30.6	31.5	31.9	31.5	30.6	29.5	29.0	28.5	28.1	27.6	27.3	27.7
Pittsburg, Pa.....	23.5	23.0	22.3	22.0	21.5	21.1	21.2	21.6	22.5	23.6	25.4	26.6	27.9	29.0	29.7	29.9	29.8	29.1	28.4	27.5	26.6	26.0	25.7	25.4	25.4
Portland, Oreg.....	38.0	37.7	37.8	37.3	37.2	36.8	36.5	36.4	36.1	36.1	36.3	36.8	38.1	39.6	40.8	41.6	42.4	43.0	43.5	42.8	41.8	40.7	39.9	38.9	39.0
St. Louis, Mo.....	22.1	21.6	21.1	20.6	19.9	19.4	18.9	18.8	19.0	20.0	21.9	24.2	25.8	27.2	28.2	29.1	29.2	28.8	27.9	26.5	25.7	25.0	24.4	23.5	23.7
St. Paul, Minn.....	7.1	6.4	5.6	4.9	4.2	3.6	2.8	2.1	1.9	2.3	4.1	6.4	8.5	10.2	11.9	12.7	13.3	13.2	12.4	11.2	10.4	9.5	8.4	7.8	7.5
Salt Lake City, Utah.	27.8	27.3	26.6	26.1	25.5	25.1	25.1	26.1	25.1	24.5	25.9	28.6	30.5	32.0	32.8	33.9	34.6	34.7	33.7	32.1	31.1	30.4	29.4	28.2	29.1
San Diego, Cal.....	51.6	51.0	50.4	50.2	49.9	49.8	49.5	49.2	48.5	48.2	49.3	51.8	54.3	56.0	57.4	58.1	58.4	58.2	57.9	56.8	55.5	54.7	53.5	52.4	53.0
San Francisco, Cal...	50.1	49.8	49.5	49.0	48.8	48.4	48.0	47.5	46.8	46.4	46.8	48.8	50.1	51.6	53.3	55.4	56.4	56.7	55.3	54.4	52.6	51.6	51.2	50.6	50.8
Santa Fe, N. Mex ...	26.0	25.1	24.2	23.2	22.4	21.7	21.0	20.6	19.7	21.5	25.2	27.7	30.2	32.1	34.1	35.6	36.8	36.5	35.4	33.1	30.0	28.9	28.1	27.0	27.8
Savannah, Ga.....	47.6	47.0	46.2	45.5	45.3	44.9	44.5	44.7	46.2	48.6	51.0	53.5	55.1	56.9	57.7	57.2	56.8	54.4	52.2	51.0	49.8	49.5	48.8	48.3	50.1
Washington, D. C....	24.7	24.4	23.5	23.2	22.2	22.4	21.9	22.9	24.5	27.0	29.2	30.4	31.8	33.0	33.5	33.2	32.6	31.2	29.9	29.2	28.1	27.6	26.8	26.4	27.5
West Indies.																									
Basseterre, St. Kitts.	74.2	73.8	73.4	73.7	73.9	74.1	73.8	75.9	77.5	78.1	78.6	80.0	79.4	79.4	78.8	77.9	76.9	75.4	75.1	74.8	74.4	74.4	74.4	74.4	75.9
Bridgetown, Bar.....	72.6	72.4	72.4	72.5	72.6	73.0	75.5	77.0	78.1	79.2	79.9	80.8	80.5	80.4	79.2	77.9	76.2	74.8	74.4	74.1	73.9	73.7	73.1	72.9	75.7
Colon, U. S. C.....	77.4	77.3	77.0	76.9	76.4	76.3	76.4	77.5	79.5	80.8	81.9	81.9	81.8	81.5	80.9	80.5	79.7	78.8	78.5	78.6	78.2	78.0	78.0	77.8	78.8
Havana, Cuba.....	68.5	67.9	67.5	67.2	66.7	66.8	67.0	67.9	70.5	73.5	75.6	76.9	77.2	77.4	77.2	76.0	75.3	74.0	72.8	72.1	71.4	70.8	69.9	69.0	71.6
Kingston, Jamaica ..	69.0	68.6	68.6	68.2	68.2	68.0	67.8	71.8	77.1	80.1	81.8	82.6	83.2	83.0	82.1	81.6	81.0	79.1	76.5	74.3	72.6	71.4	70.4	70.0	74.9
Port of Spain, Trin..	71.4	71.0	70.8	70.5	70.6	71.0	74.5	78.2	80.0	81.6	82.5	83.0	84.0	83.7	82.8	81.4	79.1	76.4	75.2	74.5	73.8	73.0	72.4	72.1	76.4
San Juan, P. R.....	71.6	71.1	70.6	70.4	70.1	70.2	71.9	74.6	77.1	78.6	79.4	79.5	80.0	80.0	79.5	78.5	77.0	75.6	74.8	74.1	73.3	72.8	72.0	72.0	74.8
Santiago de Cuba...	70.6	69.9	69.2	68.9	68.4	68.2	68.5	72.1	76.5	79.9	82.3	83.3	83.8	83.6	83.0	81.8	80.2	77.9	76.1	75.2	74.1	73.3	72.4	71.4	75.4
Santo Domingo, S. D.	68.1	67.3	66.9	66.2	66.3	66.0	66.8	71.5	75.8	79.0	80.3	80.6	80.8	80.1	80.2	79.5	78.3	76.9	75.7	74.4	72.6	71.0	69.8	68.9	73.5
Willemstad, Curaçao	75.0	74.8	74.5	74.6	74.4	74.7	76.2	77.2	78.1	79.0	80.5	80.6	80.6	80.0	79.4	78.8	77.4	76.7	76.2	76.0	75.9	75.8	75.2	75.0	76.9

TABLE IV.—*Mean pressure for each hour of seventy-fifth meridian time, February*, 1899.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	28.258	.261	.261	.264	.261	.260	.261	.263	.259	.256	.255	.255	.250	.237	.221	.212	.209	.217	.223	.233	.238	.241	.239	.241	.245
Boston, Mass.....	29.820	.818	.818	.821	.825	.831	.844	.852	.857	.852	.849	.832	.818	.809	.805	.804	.811	.824	.824	.823	.827	.824	.825	.822	.826
Buffalo, N. Y.....	29.164	.160	.158	.153	.153	.159	.161	.169	.177	.176	.176	.171	.150	.138	.139	.134	.134	.140	.148	.149	.150	.152	.151	.152	.155
Chicago, Ill.....	29.148	.146	.145	.138	.137	.137	.141	.152	.156	.158	.164	.164	.151	.138	.123	.121	.122	.126	.132	.140	.139	.142	.141	.140	.142
Cincinnati, Ohio	29.410	.411	.410	.401	.404	.413	.415	.422	.428	.432	.432	.428	.409	.390	.379	.378	.379	.383	.387	.393	.395	.401	.400	.399	.404
Cleveland, Ohio	29.206	.205	.204	.205	.207	.210	.215	.216	.228	.227	.225	.216	.198	.183	.178	.182	.181	.188	.193	.194	.198	.198	.195	.195	.202
Detroit, Mich.....	29.248	.246	.241	.239	.237	.241	.244	.248	.255	.257	.256	.254	.239	.223	.214	.210	.211	.218	.226	.235	.234	.235	.237	.238	.237
Dodge, Kans	27.418	.418	.418	.417	.411	.410	.411	.407	.414	.424	.428	.428	.422	.401	.375	.361	.359	.355	.362	.375	.388	.398	.411	.419	.401
Eastport, Me	29.801	.801	.792	.788	.791	.793	.801	.813	.824	.827	.821	.814	.804	.795	.786	.782	.783	.787	.789	.791	.791	.793	.792	.794	.798
Galveston, Tex.....	30.012	.006	.999	.996	.995	.999	.008	.011	.028	.037	.042	.046	.029	.010	.984	.970	.959	.961	.961	.972	.986	.000	.007	.008	.001
Havre, Mont.....	27.377	.380	.375	.370	.367	.359	.353	.349	.348	.351	.359	.361	.364	.365	.352	.339	.340	.341	.340	.338	.346	.346	.346	.352	.355
Kansas City, Mo.....	29.085	.084	.092	.090	.078	.080	.084	.086	.094	.103	.111	.111	.106	.090	.073	.055	.047	.048	.051	.058	.063	.070	.076	.080	.079
Key West, Fla.....	30.056	.049	.045	.040	.038	.043	.056	.069	.086	.100	.099	.094	.075	.055	.039	.031	.029	.030	.035	.047	.053	.057	.060	.061	.056
Marquette, Mich	29.149	.148	.141	.136	.132	.132	.131	.134	.134	.135	.136	.136	.124	.112	.104	.105	.107	.115	.125	.127	.132	.138	.140	.140	.130
Memphis, Tenn.....	29.703	.701	.701	.701	.699	.704	.716	.725	.735	.743	.747	.750	.729	.706	.679	.670	.661	.659	.664	.665	.671	.682	.687	.690	.699
Mt. Tamalpais, Cal .	27.650	.652	.653	.649	.650	.646	.648	.652	.660	.668	.684	.695	.705	.704	.691	.674	.662	.657	.649	.642	.641	.645	.654	.658	.662
New Orleans, La.....	30.028	.026	.029	.026	.025	.029	.037	.052	.061	.068	.070	.063	.051	.025	.007	.993	.989	.989	.995	.002	.012	.019	.022	.026	.027
New York, N. Y.....	29.662	.663	.656	.661	.664	.672	.682	.693	.697	.694	.693	.682	.665	.651	.647	.646	.655	.665	.671	.672	.678	.676	.670	.665	.670
Philadelphia, Pa.....	29.916	.915	.912	.914	.920	.923	.935	.950	.953	.954	.952	.939	.919	.909	.905	.905	.908	.913	.919	.918	.918	.919	.916	.912	.923
Pittsburg, Pa.....	29.148	.145	.137	.138	.139	.139	.145	.151	.162	.164	.165	.153	.138	.120	.115	.117	.120	.126	.135	.138	.139	.134	.135	.131	.139
St. Louis, Mo.....	30.029	.028	.031	.034	.036	.038	.036	.034	.035	.037	.045	.053	.061	.064	.061	.050	.039	.029	.028	.024	.022	.025	.030	.030	.037
St. Paul, Minn.....	29.483	.485	.484	.478	.476	.483	.490	.496	.507	.515	.517	.514	.506	.488	.469	.460	.457	.458	.460	.467	.471	.471	.475	.475	.483
St. Paul, Minn.....	29.111	.109	.106	.107	.104	.106	.109	.110	.116	.121	.123	.127	.124	.112	.100	.096	.094	.095	.098	.103	.105	.108	.104	.105	.108
Salt Lake City, Utah.	25.630	.630	.626	.624	.621	.616	.615	.617	.622	.632	.639	.649	.654	.652	.642	.628	.624	.625	.625	.627	.630	.631	.630	.626	.630
San Diego, Cal.....	29.958	.960	.957	.958	.955	.950	.946	.947	.952	.960	.976	.988	.996	.992	.970	.949	.935	.931	.929	.933	.938	.944	.951	.961	.956
San Francisco, Cal...	30.013	.016	.017	.016	.015	.013	.016	.019	.027	.036	.051	.061	.062	.059	.040	.017	.005	.998	.993	.989	.994	.002	.009	.016	.020
Santa Fe, N. Mex ...	23.096	.097	.098	.096	.092	.085	.084	.086	.091	.098	.107	.112	.114	.104	.082	.066	.059	.058	.061	.067	.078	.087	.095	.100	.088
Savannah, Ga.....	30.005	.004	.001	.999	.004	.010	.021	.029	.038	.045	.047	.036	.009	.985	.972	.966	.962	.969	.980	.987	.996	.001	.007	.009	.003
Washington, D. C....	29.952	.953	.950	.947	.950	.960	.968	.980	.985	.984	.980	.974	.948	.932	.929	.929	.928	.938	.942	.946	.950	.951	.949	.946	.953
West Indies.																									
Basseterre, St. Kitts.	30.035	.019	.011	.011	.018	.031	.050	.063	.078	.081	.072	.051	.033	.018	.000	.008	.011	.019	.034	.050	.060	.062	.060	.051	.039
Bridgetown, Bar....	29.944	.938	.936	.941	.956	.969	.984	.001	.006	.999	.983	.962	.945	.932	.931	.936	.942	.951	.964	.975	.978	.976	.973	.961	.962
Colon, U. S. C.....	29.847	.835	.822	.818	.819	.825	.849	.865	.880	.885	.880	.866	.844	.824	.804	.795	.794	.801	.814	.834	.848	.857	.860	.859	.839
Havana, Cuba.....	29.991	.983	.976	.973	.974	.982	.997	.009	.023	.036	.034	.021	.998	.974	.958	.954	.958	.962	.970	.982	.995	.004	.006	.002	.990
Kingston, Jamaica..	29.711	.697	.680	.677	.677	.685	.708	.721	.738	.741	.733	.710	.683	.658	.641	.638	.644	.653	.672	.691	.713	.723	.725	.722	.698
Port of Spain, Trin..	29.800	.880	.874	.881	.894	.914	.932	.945	.949	.938	.920	.896	.872	.856	.852	.858	.866	.876	.892	.905	.915	.917	.915	.904	.898
Roseau, Dominica ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Juan, P. R.....	29.972	.962	.957	.958	.968	.984	.998	.015	.026	.026	.015	.996	.975	.958	.948	.951	.956	.962	.973	.986	.995	.998	.993	.985	.981
Santiago de Cuba...	29.920	.908	.896	.895	.902	.917	.931	.947	.956	.959	.949	.925	.901	.876	.866	.868	.877	.882	.895	.918	.930	.939	.939	.932	.914
Santo Domingo, S. D.	30.012	.997	.989	.989	.997	.012	.031	.045	.057	.060	.043	.023	.002	.980	.968	.965	.970	.977	.991	.010	.023	.032	.032	.025	.009
Willemstad, Curaçao	29.867	.854	.849	.849	.861	.876	.895	.909	.923	.921	.904	.881	.858	.836	.825	.821	.825	.834	.851	.868	.883	.889	.889	.881	.869

TABLE V.—*Average wind movement for each hour of seventy-fifth meridian time, February, 1899.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex.	10.4	10.3	10.1	9.8	10.6	11.1	11.2	11.3	10.6	11.5	13.3	13.8	14.2	13.2	12.9	12.3	12.4	11.7	11.6	9.9	9.0	8.7	9.3	9.9	11.2
Albany, N. Y.	6.7	6.9	6.5	6.5	6.8	6.1	6.6	7.0	7.8	8.0	9.5	10.4	10.3	11.0	10.8	10.2	9.3	8.4	7.5	8.1	7.8	7.3	6.6	7.2	8.1
Alpena, Mich.	8.9	8.4	8.4	8.5	8.2	8.0	8.4	8.4	8.2	9.1	10.2	10.4	10.1	10.8	11.1	11.1	11.0	10.0	9.2	8.3	7.9	8.5	8.6	8.5	9.2
Amarillo, Tex.	16.2	16.2	16.2	16.5	15.7	14.5	13.3	12.9	11.7	11.6	13.2	14.2	15.2	15.6	16.2	17.0	16.9	16.9	16.3	14.9	15.8	16.6	16.4	15.7	15.2
Atlanta, Ga.	11.3	12.1	12.0	11.8	11.0	10.9	10.2	10.8	10.0	10.5	10.9	11.9	13.1	13.1	13.5	13.2	12.6	11.8	10.6	10.9	10.9	10.9	10.2	11.2	11.5
Atlantic City, N. J.	13.3	13.3	12.8	13.4	12.2	12.8	12.4	12.2	13.9	14.3	13.9	13.0	13.9	14.6	14.5	14.5	14.2	13.6	13.7	14.1	13.4	12.9	13.1	13.2	13.4
Augusta, Ga.	6.9	6.8	6.1	6.3	6.6	6.8	6.7	6.7	6.8	7.2	8.7	10.0	11.4	11.0	11.8	12.0	11.2	9.8	8.1	7.7	7.3	7.0	6.8	7.1	8.2
Baker City, Oreg.	4.9	4.8	4.5	4.6	4.9	5.7	5.4	5.6	5.6	5.9	5.7	5.4	5.2	5.1	4.8	5.1	5.2	4.5	4.4	4.4	3.5	3.7	4.0	4.1	4.9
Baltimore, Md.	5.3	5.1	4.7	4.8	5.1	5.1	4.7	4.9	5.5	5.9	6.5	7.1	7.5	7.6	7.6	7.2	7.2	6.2	6.2	5.6	5.4	5.1	5.2	5.5	5.9
Bismarck, N. Dak.	9.8	8.6	9.1	9.8	9.7	9.4	9.5	9.4	8.1	8.5	10.9	12.1	13.9	14.5	15.5	16.1	15.9	14.3	13.2	10.6	9.5	8.6	9.3	9.6	11.1
Block Island, R. I.	17.2	17.5	18.8	19.4	20.1	20.1	19.0	18.0	18.2	18.9	18.2	18.0	18.1	18.0	17.8	17.5	16.9	16.2	17.4	17.2	17.6	18.4	18.0	17.2	18.1
Boise, Idaho	3.6	3.2	3.7	3.6	3.5	3.5	3.6	3.4	3.0	2.8	3 4	4.5	4.9	5.3	5.8	6.0	6.1	5.6	5.9	5.1	3.6	3.4	3.2	2.9	4.1
Boston, Mass.	12.5	12.1	12.5	12.3	12.2	12.4	12.6	13.1	13.8	14.2	14.0	13.8	13.7	14.0	14.1	14.0	14.4	12.9	13.1	12.4	12.4	11.8	12.4	12.0	13.0
Buffalo, N. Y.	15.5	15.1	14.4	14.3	14.6	15.8	15.5	15.0	15.4	15.8	17.1	16.9	17.8	18.7	18.5	19.2	18.4	17.4	16.2	15.7	15.5	15.9	15.3	15.8	16.2
Cairo, Ill.	9.8	10.1	9.9	10.1	10.1	10.4	10.6	10.6	11.0	11.5	11.5	11.4	11.9	12.8	12.6	12.6	12.6	12.2	10.9	10.8	11.3	11.3	10.6	10.1	11.1
Cape Henry, Va.	15.4	15.4	16.2	16.7	17.0	17.2	17.0	16.4	15.7	16.5	17.1	16.9	16.0	15.8	15.0	15.1	15.4	15.3	14.9	15.1	15.8	15.2	15.1	15.0	15.9
Carson City, Nev.	7.6	7.1	6.1	5.8	5.6	5.8	5.1	4.5	4.5	4.8	4.5	4.2	5.5	5.8	6.9	8.4	9.5	11.7	11.8	11.6	10.6	8.7	7.3	8.1	7.1
Charleston, S. C.	12.1	11.5	12.1	12.2	11.8	11.3	10.8	10.8	11.7	13.0	13.7	13.4	13.7	14.6	14.9	14.5	14.0	13.1	12.2	12.2	13.1	12.2	12.8	12.0	12.7
Charlotte, N. C.	8.1	7.7	7.8	7.8	8.0	8.3	8.1	8.2	8.1	9.9	10.1	10.2	10.1	10.2	11.0	11.7	11.0	10.4	8.5	8.0	8.0	8.1	8.0	8.1	9.0
Chattanooga, Tenn.	9.8	9.4	9.8	9.2	8.2	7.9	8.1	7.3	7.8	8.3	8.2	9.4	10.3	10.7	10.5	10.9	11.6	10.2	9.9	9.2	8.8	9.0	9.4	8.8	9.3
Cheyenne, Wyo.	12.8	13.0	12.5	12.8	13.4	12.3	12.8	13.4	11.8	11.8	12.0	12.1	14.3	15.9	15.5	15.1	15.4	15.3	14.0	12.2	10.8	11.4	12.8	12.5	13.2
Chicago, Ill.	18.4	18.1	18.1	18.5	17.9	18.4	19.2	18.7	18.5	17.7	17.3	17.0	17.9	18.4	18.0	17.5	18.5	18.4	18.1	17.6	17.9	18.2	17.9	18.3	18.1
Cincinnati, Ohio.	8.7	8.8	8.0	7.9	7.6	7.2	7.4	8.2	8.4	9.1	9.6	10.0	11.2	11.4	12.0	11.8	11.5	10.3	9.8	9.9	9.4	9.2	9.4	9.2	9.4
Cleveland, Ohio	14.8	14.5	14.9	14.9	15.0	15.0	14.8	15.2	16.3	16.1	16.8	16.9	16.2	16.6	17.4	17.4	17.2	15.6	15.8	15.1	14.9	14.5	14.2	14.9	15.6
Columbia, Mo.	9.3	8.8	8.3	7.8	8.0	8.1	8.1	8.1	8.6	8.7	9.7	11.2	11.5	12.0	12.0	12.1	11.6	11.3	9.9	9.2	8.9	8.8	8.7	9.2	9.6
Columbus, Ohio	7.6	7.8	8.2	7.6	7.9	8.0	8.1	7.9	8.2	8.7	9.5	10.2	10.7	11.5	11.4	11.2	10.8	10.2	9.3	8.2	8.6	8.3	8.2	8.3	9.0
Concordia, Kans.	6.9	7.2	6.8	6.6	6.6	6.5	6.2	6.4	6.3	6.9	8.2	8.8	9.2	9.7	9.8	9.8	9.4	9.0	7.7	6.0	6.6	6.8	6.5	6.5	7.5
Corpus Christi, Tex.	10.7	10.8	10.4	10.4	10.6	10.7	10.7	10.7	10.9	10.7	11.0	11.9	11.9	12.4	12.5	12.8	13.5	13.1	12.2	11.4	10.6	10.1	11.1	10.8	11.3
Davenport, Iowa.	8.1	7.5	7.2	7.3	7.1	7.2	7.0	7.0	7.7	8.4	8.4	9.6	9.9	10.6	11.1	11.2	11.3	10.7	9.6	8.8	8.0	7.8	7.8	7.9	8.6
Denver, Colo.	8.0	8.4	8.3	8.3	8.7	7.8	7.2	7.5	7.6	7.6	8.5	8.0	9.5	10.6	12.1	12.0	12.0	12.3	11.0	8.5	6.9	7.2	7.3	8.8	8.9
Des Moines, Iowa.	8.5	8.1	8.0	7.7	7.5	7.4	7.4	8.0	8.2	8.7	9.4	9.6	10.4	10.5	11.1	11.0	11.6	10.6	9.6	8.1	8.1	8.1	8.3	7.9	8.9
Detroit, Mich.	9.9	9.7	9.9	9.3	9.6	9.9	9.8	10.0	10.1	11.1	11.6	12.1	11.8	12.6	12.8	13.6	13.1	12.1	10.9	11.4	11.2	11.6	10.8	9.7	11.0
Dodge, Kans.	10.2	10.7	10.9	10.0	10.3	9.2	8.5	8.3	8.8	10.4	11.8	11.7	11.9	11.6	12.5	12.5	12.2	12.4	10.9	9.3	9.1	9.1	8.9	9.8	10.5
Dubuque, Iowa.	7.1	6.9	6.9	6.2	6.5	6.5	7.2	6.9	7.2	8.3	8.3	9.2	9.8	9.9	11.1	10.9	10.9	10.2	8.8	7.8	7.9	7.5	7.1	6.9	8.2
Duluth, Minn.	11.6	12.2	12.1	12.2	12.4	11.6	11.1	10.7	10.5	10.7	10.3	9.6	10.4	10.9	10.9	10.7	10.6	9.8	8.9	9.4	9.5	9.9	10.2	10.5	10.7
Eastport, Me.	12.1	12.6	13.2	13.3	13.4	12.6	12.6	12.8	12.9	13.0	13.2	13.5	13.5	12.9	12.3	12.4	12.9	11.8	12.2	11.7	11 6	12.0	12.5	12 8	12.7
El Paso, Tex.	13.9	13.4	13.2	14.3	15.3	13.0	13.0	13.1	11.6	10.9	12.5	13.5	16.0	17.4	18.2	20.4	22.4	22.1	22.5	19.8	14.9	14.3	14.2	13.8	15.6
Erie, Pa.	10.1	10.7	10.2	10.3	10.6	10.9	10.6	10.9	11.9	12.5	12.7	12.6	12.8	13.2	12.6	12.1	12.6	11.6	11.4	11.4	10.9	10.1	9.6	10.0	11.4
Escanaba, Mich.	6.8	6.8	6.8	6.8	6.8	7.1	7.4	7.3	7.0	7.3	7.6	8.3	9.1	10.0	10.3	9.8	9.9	10.1	9.6	9.1	8.8	7.9	7.5	7.2	8.1
Eureka, Cal.	6.9	5.3	5.0	4.5	4.0	4.2	4.3	4.9	4.8	4.5	4.2	3.6	4.1	5.3	6.6	8.6	10.2	10.5	11.4	10.9	9.9	8.9	8.2	7.7	6.6
Evansville, Ind.	8.3	8.6	8.4	8.1	7.8	7.7	7.9	8.0	8.9	9.5	10.2	10.2	10.6	10.2	10.3	10.4	10.4	9.5	8.8	8.8	8.6	9.0	8.8	8.9	9.1
Fort Canby, Wash.	16.2	17.3	16.8	17.6	18.1	17.5	17.4	17.5	16.5	15.6	16.1	15.9	16.0	17.1	16.8	17.2	17.0	17.1	16.8	16.1	16.2	16.6	15.6	15.8	16.7
Fort Smith, Ark.	6.1	6.5	7.0	7.0	7.4	7.2	7.8	7.5	8.0	9.1	9.4	9.0	9.2	8.8	9.0	10.0	10.2	9.4	8.8	7.9	6.6	6.1	6.0	6.1	7.9
Fresno, Cal.	3.8	3.4	3.2	3.4	3.2	3.2	3.4	3.5	3.3	3.5	3.3	3.8	4.4	4.2	4.1	4.2	3.9	4.0	4.5	4.2	3.4	3.4	3 6	3.6	3.7
Galveston, Tex.	11.1	11.0	11.0	11.1	11.1	10.9	11.6	11.5	12.0	11.9	12.9	12.5	12.6	11.9	11.2	11.2	11.2	11.1	10.6	10.6	11.1	10.9	11.3	11.7	11.4
Grand Haven, Mich.	9.3	8.5	8.8	8.7	8.4	8.7	9.0	9.3	9.9	10.4	11.0	10.9	11.1	11.3	11.2	11.6	11.8	10.5	9.7	9.7	9.8	10.1	10.4	10.0	10.0
Grand Junction, Colo.	3.6	4.0	4.7	4.1	4.1	3.9	3.5	3.2	4.0	4.1	4.7	5.2	6.1	7.0	7.5	7.1	7.9	8.0	7.2	5.8	4.2	3.7	3.3	3.7	5.0
Green Bay, Wis.	7.4	7.4	7.5	6.9	6.9	6.9	7.4	7.9	7.7	8.5	9.0	8.9	9.1	9.6	9.8	10.0	10.2	9.2	8.3	8.0	8.1	8.3	8.5	8.4	8.3
Hannibal, Mo.	10.0	9.9	10.6	9.6	9.6	9.6	10.2	9.5	9.5	11.0	11.4	11.7	12.1	12.6	12.7	12.5	12.6	11.4	9.9	9.1	9.2	9.1	9.5	9.8	10.5
Harrisburg, Pa.	6.9	6.4	6.8	6.8	6.6	6.5	6.9	6.6	7.1	8.4	9.7	9.4	10.2	10.2	9.6	9.1	8.4	7.7	8.0	7.6	7.2	7.2	7.0	6.9	7.8
Hatteras, N. C.	15.9	16.7	16.1	17.2	16.7	17.4	17.8	17.0	16.6	16.9	17.1	16.5	16.1	16.5	16.6	16.1	15.0	15.0	15.2	15.0	14.9	14.8	14.4	14.9	16.1
Havre, Mont.	10.1	10.7	11.3	12.2	11.8	12.0	10.6	11.5	11.5	12.5	12.4	11.5	12.0	13.7	13.5	13.3	13.1	12.5	12 1	12.6	12.4	11.9	11.5	11.5	12.0
Helena, Mont.	8.2	8.0	8.4	8.9	9.1	8.5	7.7	7.4	8.6	9.0	9.5	9.4	9.2	9.5	9.8	10.1	10.1	9.4	8.0	9.0	8.4	8.5	7.2	8.6	8.8
Huron, S. Dak.	12.1	12.2	11.8	12.0	12.2	11.6	12.1	12.9	12.6	12.5	13.6	12.7	12.8	13.3	13.8	14.2	14.5	13.4	11.8	10.6	10.5	11.4	12 2	12.1	12.5
Idaho Falls, Idaho.	9.1	9.1	9.0	8.4	8.9	9.6	9.1	8.1	7.8	8.1	9.3	10.1	10.0	11.1	10.1	10.3	10.2	10.7	10.2	10.8	9.2	10.2	10.2	11.0	9.6
Independence, Cal.	10.0	10.0	9.9	9.7	9.3	10.0	10.3	10.0	10.6	10.1	8.6	9.0	11.2	12.3	13.6	13.7	12.8	12.9	13.1	12.9	10.8	9.8	9.5	9.7	10.8
Indianapolis, Ind.	10.9	10.6	10.8	10.8	9.8	9.9	10.0	9.8	9.9	11.0	11.6	12.5	12.7	13.9	13.8	13.9	13.4	12.9	12.2	11.4	11.5	11.7	11.9	11.6	11.6
Jacksonville, Fla.	7.3	7.5	7.4	7.1	7.0	7.1	7.0	7.7	9.4	10 9	10.8	10.5	10.7	12.0	11.6	11.4	11.2	9.9	8.5	7.9	7.5	6.9	7.1	6.9	8.8
Jupiter, Fla.	10.0	10.2	10.4	9.9	10.2	10.1	10.4	10.2	11.4	12.8	14.0	14.2	15.0	15.6	15.7	15.8	14.9	12.7	10.3	9.2	8.8	8.7	9.7	9.5	11.7
Kansas City, Mo.	8.3	8.2	8.0	8.5	8.6	8.0	8.2	8.9	9.6	10.0	10.4	10.3	11.4	11.3	11.5	11.5	11.6	10.5	9.7	8.7	8.8	8.8	8.7	8.2	9.5
Keokuk, Iowa.	8.0	9.0	8.2	8.8	8.4	8.1	8.5	8.3	8.2	9.9	9.7	10.9	10.6	11.2	11.6	11.5	11.5	10.6	9.2	8.4	7.5	7.6	7.5	7.9	9.2
Key West, Fla.	9.7	10.1	9.8	9.5	9.9	10.0	9.9	10.2	10.9	11.2	11.9	11.6	11.2	10.7	10.2	10.4	10.6	10.1	10.5	10.9	10.7	10.6	10.2	9.2	10.4
Kittyhawk, N. C.	15.8	16.2	15.7	15.5	15.3	15.1	13.9	14.4	14.5	16.1	16.1	16.2	16.4	17.1	15.7	15.1	14.2	13.5	13.2	14.8	15.8	15.6	15.5	15.4	15.3
Knoxville, Tenn.	7.8	8.1	8.0	7.9	8.6	8.5	8.6	7.8	8.2	8.2	9.2	8.8	11.1	11.5	11.5	11.0	10.5	9.5	9.6	9.8	9.1	9.4	9.4	8.4	9.2
La Crosse, Wis.	5.3	5.3	5.5	5.7	5.9	6.2	6.0	5.9	5.8	5.8	6.4	7.1	7.5	8.0	8.5	9.0	8.7	8.1	6.5	5.3	5.6	5.7	5.7	5.6	6.5
Lander, Wyo.	2.9	2.9	3.0	2.9	3.2	3.3	3.0	3.2	3.3	3.6	3.6	3.6	4.1	4.6	5.1	6.1	5.8	4.9	4.6	4.8	4.3	3.7	3.2	2.9	3.9
Lexington Ky.	13.4	12.6	11.8	11.2	11.0	10.9	11.2	11.8	12.5	12.4	12.8	12.7	13.7	14 0	13.6	13.2	12.4	11.5	11.0	11.0	11.4	11.7	12.2	12.9	12.2
Little Rock, Ark.	8.4	8.7	9.4	9.4	9.8	10.4	10.0	9.5	9.0	10.1	9.8	10.4	10.8	11·1	11.7	12.1	12.0	11.0	9.5	8.4	8.6	9.7	9.7	9.1	9.9
Los Angeles, Cal.	3.3	3.4	3.3	3.2	3.0	3.3	2.6	3.2	3.1	2.8	3.0	3.4	4.2	4.9	5.8	6.0	7.8	8.3	8.2	7.7	6.0	4.5	3.4	3.2	4.5
Louisville, Ky.	9.0	9.0	9.3	8.9	8.4	8.1	8.2	8.4	8.5	9.8	10.2	10.8	11.4	11.9	12.2	12.2	11.9	11.1	11.0	10.5	10.6	10.7	10.4	9.7	10.1
Lynchburg, Va.	3.2	3.1	3.5	3.6	3.5	3.4	3.9	4.1	5.0	6.6	6.2	6.5	6.8	6.6	7.2	6.5	6.6	5.2	4.2	4.2	3.5	4.0	4.0	3.8	4.8
Marquette, Mich.	8.2	9.6	9.3	9.0	8.6	8.4	8.0	8.9	8.9	8.8	8 9	9.5	10.2	10.0	10.1	10.2	10.1	9.1	8.0	7.9	7.6	8.1	8.4	8.8	8.9
Memphis, Tenn.	10.6	11.4	11.4	11.3	11.8	11.7	12.4	12.0	12.1	12.4	12.2	11.6	12.1	12.0	12.5	12.4	12.6	12.2	11.1	10.5	10.8	10.5	11.0	11.1	11.7
Milwaukee, Wis.	11.9	12.1	12.0	11.8	11.1	11.1	11.0	10.9	11.7	12.2	13.4	12.8	12.9	13.4	13.4	13.3	13.1	12.5	11.4	10.9	11.2	12.4	12.4	12.4	12.1
Minneapolis, Minn.	11.1	10.6	10.4	10.9	11.1	11.0	11.4	11.3	11.4	11.8	12.3	12.2	13.2	12 8	13.1	13.0	12.6	12.1	10.8	10.3	10.7	11.4	11.1	11.2	11.6
Mobile, Ala.	8.6	8.7	8.0	8.5	8.7	8.7	8.5	8.3	8.6	9.1	9.3	10.1	11.4	11.9	11.9	12.1	11.6	11.4	10.3	8.8	8.8	8.5	8.6	8.5	9.5
Montgomery, Ala.	8.1	8.5	8.4	7.6	7.4	7.3	7.9	7.4	7.9	8.5	9.4	9.9	10.0	10.1	9.6	10.2	10.2	9.6	8 9	9.0	8.4	7.5	7.9	8.1	8.7
Moorhead, Minn.	9.6	10.2	10.4	10.6	11.0	10.3	10.6	10.7	10.8	11.2	12.2	12.2	12.7	12.9	12.8	12.7	12.7	11.9	10.5	9.6	9.9	9.9	9.6	9.5	11.1
Mount Tamalpais, Cal	28.7	29.7	29.3	28.0	28.2	26.9	27.6	25.5	24.2	23.4	21.4	18.1	16.6	15.8	15.5	14.9	15.2	16.4	18.9	21.9	25.9	28.9	28.5	28.1	23.2
Nantucket, Mass.	13.9	14.0	14.4	13.6	14.2	14.9	14.6	14.6	15.3	15.6	15.5	15.0	14.8	13.5	13.2	13.1	13.0	12.8	12.5	12.9	12.7	12.7	12.5	12.6	13.8
Nashville, Tenn.	8.6	7.8	7.1	6.9	6.9	7.6	7.9	8.0	8.0	9.1	9.3	9.7	9.6	9.7	10.3	10.3	10.2	9.6	9.1	8.7	8.8	8.1	8.1	8.6	8.7
Neah, Wash.	12.2	12.9	13.1	12.4	12.9	12.1	11.9	12.1	11.5	11.8	11.0	12.1	11.5	12.0	12.0	12.3	12.1	11.7	11.3	12.1	12.0	11.4	12.0	12.2	12.0
New Haven, Conn.	9.8	10.3	10.3	9.9	9.8	10.1	9.8	9.9	10.0	10.5	10.9	10.9	11.7	12.2	12.6	11.5	11.3	10.5	10.1	9.3	9.8	9.7	9.8	9.6	10.4
New Orleans, La.	11.3	11.1	10.9	10.6	10.5	9.8	9.6	10.2	11.2	11.4	12.0	13.0	14·1	13.6	13·4	13.4	13.0	11.9	10.6	10.9	11.4	11.5	11.6	11.7	11.6
New York, N. Y.	16.3	17.4	18.2	17.7	16.9	15.0	15.5	14.6	15.7	15.7	15.9	16.7	17.8	17.7	17.5	18.0	17.4	16.2	15.4	16.2	16.4	17.1	16.5	16.5	16.6

TABLE V.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Norfolk, Va.	10.7	10.0	10.5	10.6	10.6	10.5	11.0	10.2	9.7	10.7	11.9	11.9	12.6	13.5	12.7	13.2	12.8	11.8	11.8	11.2	11.4	11.0	11.0	10.6	11.3
Northfield, Vt.	8.2	8.1	7.8	8.3	7.7	8.3	6.7	6.1	7.0	8.2	9.6	9.9	11.0	13.1	13.7	12.9	11.0	9.5	9.7	9.1	9.3	9.5	9.3	8.9	9.3
North Platte, Nebr.	7.0	7.0	7.0	8.0	7.5	7.9	8.3	8.5	8.8	9.0	9.4	11.1	12.2	12.0	13.1	13.2	13.1	12.5	11.2	9.1	7.8	8.2	7.5	7.0	9.4
Oklahoma, Okla.	10.2	11.0	11.5	11.4	10.6	10.2	10.0	10.1	9.8	10.7	12.6	13.2	13.0	12.9	12.6	12.3	12.4	12.4	11.2	10.3	10.2	9.9	9.9	10.0	11.2
Omaha, Nebr.	7.3	7.7	7.5	7.7	7.8	7.8	7.8	7.8	7.8	8.3	8.7	9.0	9.1	9.4	9.8	9.7	9.4	9.4	8.4	7.8	7.9	8.2	8.3	7.8	8.3
Oswego, N. Y.	12.6	12.1	11.2	11.1	11.2	11.6	11.7	11.5	11.2	10.9	11.0	11.0	12.5	12.5	12.1	11.8	11.7	11.7	11.8	12.1	12.7	12.1	12.2	12.6	11.8
Palestine, Tex.	6.7	7.5	7.4	7.8	7.9	8.0	8.3	8.1	7.9	9.3	9.6	10.3	10.2	10.0	9.9	10.4	10.3	9.7	8.9	7.4	6.6	7.0	7.2	6.8	8.5
Parkersburg, W. Va.	6.4	6.3	6.1	6.0	6.2	6.3	6.4	5.7	6.5	7.9	8.0	8.2	9.3	9.3	9.5	8.7	8.2	6.4	6.6	6.3	6.5	6.5	6.5	6.2	7.1
Pensacola, Fla.	10.4	10.2	10.5	9.8	10.9	11.4	10.1	10.7	10.0	11.4	11.8	11.8	11.6	12.9	12.4	12.9	12.4	11.6	10.8	8.9	8.8	9.9	10.5	10.4	10.9
Phenix, Ariz.	4.6	4.5	4.8	4.7	4.4	4.1	4.6	4.6	4.5	4.0	4.2	5.0	5.9	6.4	5.8	5.9	5.9	6.1	6.0	4.5	3.3	3.8	4.4	4.5	4.8
Philadelphia, Pa.	11.3	11.8	11.3	11.3	10.8	10.5	11.3	10.8	11.3	12.0	12.4	12.7	13.0	13.0	12.9	12.3	11.8	10.9	11.0	10.8	11.1	11.0	11.1	12.0	11.6
Pierre, S. Dak.	9.2	9.2	8.9	9.2	9.2	9.6	9.7	9.8	9.5	9.8	11.2	13.1	13.6	14.2	15.2	16.0	16.6	15.4	12.8	11.2	10.5	11.0	10.0	8.9	11.4
Pittsburg, Pa.	5.9	6.5	6.5	6.5	6.8	7.1	7.1	6.2	6.9	7.5	7.9	8.4	9.1	8.6	8.5	8.4	8.2	7.9	7.3	7.5	6.9	7.1	6.4	5.9	7.3
Point Reyes Lt., Cal.	30.5	30.2	29.5	28.6	27.9	26.3	25.1	23.3	23.3	22.3	22.6	22.3	23.0	21.9	22.6	23.4	25.0	26.0	27.6	29.0	30.3	31.2	31.6	30.4	26.4
Port Crescent, Wash.	4.9	4.9	4.7	4.9	4.8	5.1	5.1	5.3	5.8	5.2	5.0	5.2	5.0	5.7	6.0	5.9	6.1	6.6	5.8	5.4	5.1	5.3	4.9	5.4	5.3
Port Huron, Mich.	10.9	11.2	10.5	10.2	9.8	10.4	10.3	10.4	10.9	12.0	12.7	12.7	13.1	13.4	14.1	13.8	13.5	11.7	11.2	10.9	11.0	10.7	11.2	11.8	11.6
Portland, Me.	7.4	7.5	7.9	7.6	7.6	7.5	7.8	7.8	8.0	8.3	8.3	8.1	8.5	8.9	9.0	8.7	8.3	8.2	7.8	7.2	7.6	8.1	7.4	7.2	7.9
Portland, Oreg.	10.2	10.5	10.8	10.7	10.8	10.4	10.8	11.2	10.6	11.2	9.9	10.9	12.4	13.3	13.3	12.6	11.8	12.1	12.1	12.5	12.5	11.6	11.7	10.8	11.4
Pueblo, Colo.	5.0	4.8	4.2	4.2	4.1	4.3	4.0	4.2	4.5	4.6	4.8	5.2	7.3	7.9	10.0	10.8	12.1	10.5	9.5	7.1	6.0	5.4	5.4	5.2	6.3
Raleigh, N. C.	6.9	7.4	7.3	6.9	7.0	6.8	6.4	7.5	8.4	8.6	8.9	9.0	9.5	9.8	9.5	9.0	8.6	7.2	7.2	7.2	7.2	6.8	7.2	7.4	7.8
Rapid City, S. Dak.	6.6	6.9	6.6	7.6	7.1	7.3	7.8	6.9	7.0	7.4	7.7	8.0	8.8	8.9	9.1	9.5	9.8	9.1	8.9	7.6	6.2	5.6	5.6	6.1	7.6
Red Bluff, Cal.	8.5	7.8	7.6	7.0	8.0	7.3	7.9	7.7	7.8	7.4	7.1	7.4	9.2	9.1	10.0	10.8	10.6	10.2	9.9	10.1	8.9	8.9	9.2	8.5	8.6
Richmond, Va.	6.7	6.5	6.2	6.3	6.4	6.4	6.4	6.2	6.7	7.4	8.4	8.3	7.9	7.7	8.3	8.0	8.6	7.3	7.0	6.1	6.4	6.4	6.5	5.9	7.0
Rochester, N. Y.	9.0	8.6	9.1	8.6	8.4	8.7	9.1	9.1	9.9	10.4	11.1	10.0	11.2	11.0	11.4	10.9	10.9	10.7	9.9	8.9	9.2	8.9	9.2	9.2	9.7
Roseburg, Oreg.	2.9	3.2	3.0	2.9	3.1	3.1	2.9	2.9	2.9	3.3	2.9	3.3	3.4	3.2	3.6	3.5	4.5	4.7	5.6	4.9	4.7	3.0	3.0	2.8	3.5
Sacramento, Cal.	9.9	9.7	9.5	9.0	8.9	8.3	8.6	8.8	8.8	8.6	9.3	10.5	10.6	11.5	12.2	12.8	12.8	12.5	12.1	11.1	10.0	10.0	9.9	9.1	10.2
St. Louis, Mo.	10.7	11.1	11.2	11.2	12.1	11.0	10.6	10.9	10.5	10.8	11.4	11.5	12.5	12.8	12.6	13.9	13.4	12.2	11.9	11.2	11.4	11.5	11.1	10.8	11.6
St. Paul, Minn.	7.4	7.1	7.4	7.2	7.6	7.2	7.2	7.8	7.5	8.4	9.3	9.9	10.5	11.0	11.4	10.8	11.1	10.4	8.9	8.4	8.0	8.4	8.0	7.7	8.7
Salt Lake City, Utah.	4.8	4.4	4.5	4.3	4.5	4.1	3.6	3.7	3.4	3.5	4.4	5.0	7.2	7.2	7.5	7.2	7.1	6.4	5.9	4.9	4.0	3.2	3.9	4.6	5.0
San Antonio, Tex.	8.8	8.0	7.9	8.3	8.5	8.7	8.8	8.6	8.8	10.2	11.9	12.6	12.9	13.5	13.3	12.9	12.9	12.9	13.1	10.9	10.2	10.0	10.1	9.5	10.5
San Diego, Cal.	4.7	4.6	4.4	4.2	5.1	5.1	4.8	4.4	4.3	4.8	4.6	4.9	5.7	7.2	8.3	9.8	10.4	10.6	9.5	8.1	6.2	5.1	4.6	4.6	6.1
Sandusky, Ohio	8.2	8.1	7.9	8.0	8.5	7.9	7.6	8.6	8.5	8.9	9.4	9.2	9.9	10.0	9.7	9.4	9.1	8.4	8.0	7.3	7.3	7.8	8.7	9.1	8.6
San Francisco, Cal.	8.3	7.2	6.8	6.6	6.2	6.0	5.7	5.9	5.5	5.5	5.9	5.7	6.8	6.8	8.1	9.9	12.4	13.2	15.0	14.9	14.2	13.6	10.8	8.4	8.7
San Luis Obispo, Cal.	3.4	3.7	3.8	4.0	4.8	4.3	4.5	4.7	4.3	4.8	4.5	6.1	8.1	8.0	8.6	9.1	9.8	9.8	9.0	8.4	6.8	4.7	4.3	4.1	6.0
Santa Fe, N. Mex.	5.5	4.8	5.1	5.0	4.2	4.3	4.6	5.1	5.2	5.6	6.8	8.7	10.8	10.0	10.7	11.9	12.5	12.9	10.6	8.8	7.4	6.6	6.6	5.9	7.5
Sault Ste. Marie, Mich	5.9	5.5	6.2	6.1	5.8	6.2	5.9	6.0	5.8	6.1	6.9	7.9	9.3	9.8	11.6	12.1	11.4	10.2	8.6	8.4	7.4	6.4	6.6	6.1	7.6
Savannah, Ga.	10.1	9.0	9.4	8.8	8.9	8.6	7.9	8.5	10.0	10.7	11.0	10.9	11.7	11.6	11.9	11.7	11.6	10.7	9.9	10.4	10.0	10.6	10.3	10.3	10.2
Seattle, Wash.	6.6	6.9	7.5	6.5	6.8	7.0	7.2	6.5	7.1	7.0	6.4	6.8	6.4	6.9	7.4	8.1	8.1	8.5	8.2	8.5	8.5	7.9	8.1	7.2	7.3
Shreveport, La.	8.0	7.8	8.0	8.2	8.2	8.1	8.0	8.7	8.9	9.1	10.2	10.2	9.7	9.8	9.8	9.6	9.6	9.1	7.8	6.6	6.7	7.6	8.2	7.9	8.6
Sioux City, Iowa.	10.4	11.8	11.8	11.6	11.6	11.6	11.5	11.3	10.5	11.2	13.8	15.7	17.1	17.5	18.1	18.5	17.7	16.5	14.0	12.2	11.8	11.1	10.9	10.6	13.3
Spokane, Wash.	7.6	7.9	8.3	8.2	7.4	7.1	6.9	6.9	6.4	7.0	7.5	6.9	7.1	7.4	8.8	9.2	9.5	8.9	8.4	8.1	8.3	7.6	8.0	7.1	7.8
Springfield, Ill.	10.1	10.2	10.0	10.2	9.9	9.6	9.3	9.7	9.9	10.4	10.1	10.3	12.0	12.8	12.1	12.3	11.9	11.8	10.5	10.8	10.1	10.9	10.9	10.2	10.7
Springfield, Mo.	11.8	11.5	11.3	11.4	11.0	10.6	10.8	10.4	10.7	11.1	12.9	13.1	14.3	14.8	14.9	14.4	14.3	13.9	11.9	11.7	11.4	11.3	11.0	11.3	12.1
Tacoma, Wash.	7.7	8.4	8.0	8.0	7.9	7.8	7.6	8.1	8.0	7.9	7.9	8.8	9.2	9.4	10.5	10.8	10.5	10.3	9.8	9.6	9.9	9.6	10.1	8.7	8.9
Tampa, Fla.	6.0	6.1	6.3	6.3	6.2	6.1	6.3	6.2	7.8	8.8	9.4	9.9	10.1	10.6	10.6	10.2	9.8	8.7	7.7	6.8	6.9	6.7	6.4	5.5	7.7
Toledo, Ohio.	9.2	9.1	9.5	9.6	9.5	9.8	10.1	10.1	10.5	11.2	11.6	11.6	11.7	12.3	12.7	12.7	12.7	11.4	11.0	10.6	11.2	10.6	10.7	10.3	10.8
Vicksburg, Miss.	8.2	8.0	7.5	7.6	7.1	7.0	7.4	8.4	9.1	9.8	10.1	9.4	9.6	10.0	9.8	9.4	9.7	9.0	8.4	8.5	8.4	8.9	9.4	9.0	8.7
Vineyard Haven, Mass	10.8	11.1	11.1	11.5	11.5	11.6	11.8	11.5	11.8	11.8	12.2	12.0	11.8	11.1	10.9	11.1	10.6	10.1	10.3	10.0	10.2	10.0	10.3	10.7	11.1
Walla Walla, Wash.	5.8	6.3	6.5	7.1	7.2	6.9	6.7	6.4	6.3	6.1	6.4	6.7	7.8	8.4	9.0	8.8	8.4	8.2	7.8	7.1	6.1	5.9	5.8	6.0	7.0
Washington, D. C.	7.1	7.4	6.1	6.8	6.6	6.6	6.1	6.5	7.2	8.5	10.1	10.9	11.4	11.2	10.9	11.1	10.6	9.2	7.9	7.1	6.8	6.9	7.3	7.0	8.2
Wichita, Kans.	7.8	8.4	8.7	8.5	8.5	8.8	9.2	8.6	8.5	9.5	10.8	11.6	11.4	11.4	12.4	12.1	11.7	11.5	9.4	7.9	8.1	7.8	8.1	8.3	9.5
Williston, N. Dak.	9.6	10.1	9.1	8.6	9.2	9.1	8.4	8.4	7.9	8.3	8.7	11.0	13.9	14.8	16.0	16.7	15.5	13.8	12.7	10.4	9.2	9.0	8.4	8.7	10.8
Wilmington, N. C.	9.7	10.0	9.7	9.6	9.3	8.5	9.2	9.5	10.4	10.9	10.9	11.1	11.1	11.5	11.1	11.5	11.3	10.5	9.7	9.8	9.7	10.0	9.6	9.5	10.2
Winnemucca, Nev.	10.3	10.6	9.6	9.9	9.5	9.9	9.6	10.1	11.2	10.6	10.9	10.4	12.1	13.1	13.9	13.9	14.7	14.4	14.4	13.4	11.2	9.5	10.1	10.2	11.4
Woods Hole, Mass.	18.3	18.2	17.9	17.9	18.7	18.6	19.0	18.6	17.6	17.7	16.5	17.0	16.3	16.5	16.1	16.3	16.2	16.7	16.9	16.9	16.5	16.8	17.0	17.3	17.3
Yankton, S. Dak.	9.1	9.8	9.9	9.1	8.6	9.1	8.7	8.4	9.8	10.6	12.8	12.6	13.8	13.4	14.1	13.2	13.8	12.5	10.4	8.9	8.6	8.1	8.0	8.3	10.5
West Indies.																									
Basseterre, St. Kitts.	10.2	10.8	10.8	10.6	10.5	10.3	10.2	11.4	12.8	12.9	12.9	12.7	12.6	12.8	11.8	11.6	11.2	10.4	10.2	10.6	10.5	10.3	10.5	10.9	11.2
Bridgetown, Bar.	6.7	6.8	6.9	7.0	6.9	6.9	7.7	11.9	13.6	14.4	14.1	14.8	14.3	14.2	13.9	13.2	11.2	8.5	7.5	8.0	7.4	6.9	7.2	6.8	9.9
Colon, U. S. C.	7.2	7.5	7.1	7.2	6.9	6.4	5.9	6.1	6.0	5.8	6.7	7.3	8.1	8.2	8.8	9.2	9.1	8.3	8.0	7.3	7.5	6.9	7.2	7.3	7.3
Havana, Cuba.	6.0	6.2	6.4	5.8	6.0	5.9	6.6	6.4	7.2	9.0	10.8	10.6	11.4	12.8	13.8	14.9	15.0	13.7	11.2	8.4	7.2	7.1	6.2	6.1	8.9
Kingston, Jamaica.	5.1	5.2	5.3	5.1	5.5	5.4	5.5	4.6	3.3	4.9	7.3	10.7	13.5	16.4	16.6	14.6	12.5	9.7	6.1	4.4	4.3	4.4	4.5	5.0	7.5
Port of Spain, Trin'd.	2.3	2.1	2.2	2.6	2.3	2.1	2.0	3.5	6.6	7.9	8.9	9.1	9.8	9.3	9.2	8.9	7.1	5.3	3.5	2.5	2.4	2.1	2.3	2.2	4.8
San Juan, Porto Rico.	4.1	4.2	3.9	4.3	4.3	4.3	4.0	4.9	7.0	9.2	10.6	11.2	11.3	12.1	12.0	11.4	10.3	8.8	7.5	6.0	5.0	4.9	4.0	4.2	7.1
Santiago de Cuba.	3.7	3.7	3.9	3.3	3.3	3.3	2.9	3.2	4.2	4.9	6.2	7.8	8.8	9.4	9.2	8.8	7.5	6.2	3.8	3.6	3.8	3.9	3.6	3.7	5.1
Willemstad, Curaçao.	11.9	12.2	12.0	11.7	11.7	11.6	11.6	14.2	16.0	16.6	17.5	17.6	17.1	17.6	17.0	16.7	16.2	14.4	13.4	12.8	12.5	12.6	12.1	12.1	14.1

TABLE VI.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of February, 1899.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	16	9	8	33	n. 74 w.	26
Portland, Me	18	12	3	35	n. 79 w.	33
Northfield, Vt	19	31	2	10	s. 34 w.	14
Boston, Mass	14	12	6	33	n. 86 w.	27
Nantucket, Mass	24	10	9	27	n. 48 w.	24
Woods Hole, Mass	21	12	8	25	n. 62 w.	19
Block Island, R. I	27	8	8	25	n. 42 w.	26
New Haven, Conn	26	12	6	22	n. 49 w.	21
Middle Atlantic States.						
Albany, N. Y	30	19	4	18	n. 86 w.	14
Binghamton, N. Y.†	7	5	7	14	n. 74 w.	7
New York, N. Y	22	11	9	27	n. 59 w.	21
Harrisburg, Pa.†	5	6	7	15	s. 83 w.	8
Philadelphia, Pa	25	12	11	26	n. 54 w.	19
Atlantic City, N. J	18	11	8	28	n. 71 w.	21
Cape May, N. J	24	13	6	22	n. 56 w.	19
Baltimore, Md	23	13	8	25	n. 60 w.	20
Washington, D. C	26	11	10	19	n. 31 w.	18
Lynchburg, Va	18	15	15	23	n. 69 w.	8
Norfolk, Va	20	20	14	11	e.	2
Richmond, Va	21	23	7	15	s. 83 w.	8
South Atlantic States.						
Charlotte, N. C	21	19	16	17	n. 27 w.	2
Hatteras, N. C	25	8	7	22	n. 42 w.	23
Raleigh, N. C	22	16	11	24	n. 65 w.	14
Wilmington, N. C	20	15	10	21	n. 66 w.	12
Charleston, S. C	17	17	11	25	w.	14
Augusta, Ga						
Savannah, Ga	19	17	14	21	n. 74 w.	7
Jacksonville, Fla	16	19	15	23	s. 69 w.	8
Florida Peninsula.						
Jupiter, Fla	12	23	15	16	s. 5 w.	11
Key West, Fla	18	13	32	8	n. 78 w.	24
Tampa, Fla	21	18	13	18	n. 59 w.	6
Eastern Gulf States.						
Atlanta, Ga	21	15	13	24	n. 61 w.	12
Pensacola, Fla	27	15	16	13	n. 14 e.	12
Mobile, Ala	28	17	9	8	n. 5 e.	11
Montgomery, Ala	20	14	15	21	n. 45 w.	8
Meridian, Miss.†	12	5	10	8	n. 16 e.	7
Vicksburg, Miss	23	20	17	7	n. 73 e.	10
New Orleans, La	26	15	16	10	n. 29 e.	12
Western Gulf States.						
Shreveport, La	28	16	20	12	n. 49 e.	11
Fort Smith, Ark	19	4	20	17	n. 11 e.	15
Little Rock, Ark	17	18	13	19	s. 80 w.	6
Corpus Christi, Tex	29	12	21	5	n. 43 w.	23
Fort Worth, Tex†	11	10	5	9	n. 76 w.	4
Galveston, Tex	22	13	25	11	n. 57 e.	17
Palestine, Tex	27	19	11	12	n. 7 w.	8
San Antonio, Tex	31	13	17	5	n. 34 e.	22
Ohio Valley and Tennessee.						
Chattanooga, Tenn	19	17	8	23	n. 82 w.	15
Knoxville, Tenn	23	16	13	18	n. 3 w.	9
Memphis, Tenn	25	19	14	13	n. 9 e.	6
Nashville, Tenn	22	16	6	22	n. 69 w.	17
Lexington, Ky.†	6	11	6	11	s. 45 w.	7
Louisville, Ky	13	21	11	20	s. 48 w.	12
Evansville, Ind.†	8	11	2	10	s. 69 w.	8
Indianapolis, Ind	16	25	8	20	s. 53 w.	15
Cincinnati, Ohio	17	20	12	20	s. 69 w.	8
Columbus, Ohio	13	20	8	25	s. 68 w.	18
Pittsburg, Pa	22	14	10	21	n. 54 w.	14
Parkersburg, W. Va	15	19	9	21	s. 72 w.	13
Elkins, W. Va	15	19	7	27	s. 79 w.	20
Lower Lake Region.						
Buffalo, N. Y	14	18	7	33	s. 82 w.	27
Oswego, N. Y	13	28	13	17	s. 15 w.	16
Rochester, N. Y	10	19	6	35	s. 73 w.	30
Erie, Pa	13	16	10	28	s. 81 w.	18
Cleveland, Ohio	16	26	11	17	s. 31 w.	12
Sandusky, Ohio	14	19	10	27	s. 74 w.	18
Toledo, Ohio	13	19	9	26	s. 71 w.	18
Detroit, Mich	14	20	7	32	s. 77 w.	16
Upper Lake Region.						
Alpena, Mich	14	13	5	33	n. 88 w.	28
Escanaba, Mich	19	18	5	25	n. 87 w.	20
Grand Haven, Mich	14	17	15	21	s. 63 w.	7
Marquette, Mich	17	12	5	34	n. 80 w.	29
Port Huron, Mich	15	20	7	24	s. 74 w.	18
Sault Ste. Marie, Mich	11	15	16	25	s. 66 w.	10
Chicago, Ill	16	17	4	27	s. 88 w.	23
Milwaukee, Wis	19	14	3	35	n. 81 w.	32
Green Bay, Wis	6	25	7	30	s. 50 w.	30
Duluth, Minn	16	16	5	37	w.	32
North Dakota.						
Moorhead, Minn	20	15	7	32	n. 79 w.	26
Bismarck, N. Dak	29	6	5	34	n. 52 w.	37
Williston, N. Dak	23	8	3	35	n. 65 w.	35

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
Upper Mississippi Valley.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
St. Paul, Minn	17	15	9	33	n. 85 w.	24
La Crosse, Wis.†	5	14	3	14	s. 51 w.	14
Davenport, Iowa	16	15	5	26	n. 87 w.	21
Des Moines, Iowa	30	10	8	21	n. 33 w.	24
Dubuque, Iowa	18	17	6	29	n. 88 w.	23
Keokuk, Iowa	22	16	5	28	n. 75 w.	24
Cairo, Ill	22	18	10	17	n. 60 w.	8
Springfield, Ill	24	16	7	21	n. 60 w.	16
Hannibal, Mo.†	9	9	3	15	w.	12
St. Louis, Mo	18	18	8	22	w.	14
Missouri Valley.						
Columbia, Mo.*	12	7	4	11	n. 54 w.	9
Kansas City, Mo	24	17	8	22	n. 63 w.	16
Springfield, Mo	24	18	12	15	n. 27 w.	7
Lincoln, Nebr	30	15	5	15	n. 34 w.	18
Omaha, Nebr	30	12	4	26	n. 51 w.	28
Sioux City, Iowa†	13	9	1	14	n. 73 w.	14
Pierre, S. Dak	20	11	7	34	n. 72 w.	28
Huron, S. Dak	19	14	8	31	n. 78 w.	24
Yankton, S. Dak†	8	5	2	21	n. 81 w.	19
Northern Slope.						
Havre, Mont	13	17	12	30	s. 77 w.	18
Miles City, Mont	16	15	4	28	n. 86 w.	14
Helena, Mont	16	18	1	36	s. 87 w.	35
Rapid City, S. Dak	28	5	11	26	n. 31 w.	28
Cheyenne, Wyo	30	7	2	27	n 47 w.	34
Lander, Wyo	18	17	14	23	n. 84 w.	9
North Platte, Nebr	28	10	11	23	n. 34 w.	22
Middle Slope.						
Denver, Colo	17	21	18	12	s. 56 e.	7
Pueblo, Colo	20	12	18	19	n. 7 w.	8
Concordia, Kans	19	21	10	19	s. 77 w.	9
Dodge, Kans	30	10	14	17	n 9 w.	20
Wichita, Kans	32	13	9	11	n. 6 w.	19
Oklahoma, Okla	27	16	9	12	n. 15 w.	11
Southern Slope.						
Abilene, Tex	23	20	15	13	n. 34 e.	4
Amarillo, Tex	24	16	16	11	n. 32 e.	9
Southern Plateau.						
El Paso, Tex	17	5	11	35	n. 63 w.	27
Santa Fe, N. Mex	29	14	14	16	n. 8 w.	15
Flagstaff, Ariz	11	15	8	34	s. 76 w.	16
Phenix, Ariz	13	9	18	24	n. 56 w.	7
Yuma, Ariz	27	9	14	17	n. 9 w.	18
Independence, Cal	31	10	7	19	n. 30 w.	24
Middle Plateau.						
Carson City, Nev	23	15	12	21	n. 48 w.	12
Winnemucca, Nev	11	32	4	22	s. 41 w.	18
Salt Lake City, Utah	5	15	12	17	s. 27 w.	11
Grand Junction, Colo	25	8	14	22	n. 25 w.	19
Northern Plateau.						
Baker City, Oreg	17	28	16	20	s. 20 w.	12
Boise, Idaho	20	10	10	29	n. 62 w.	22
Idaho Falls, Idaho	24	26	3	11	s. 76 w.	8
Spokane, Wash	14	24	12	17	s. 27 w.	11
Walla Walla, Wash	5	39	1	16	s. 24 w.	37
North Pacific Coast Region.						
Fort Canby, Wash	6	20	21	17	s. 16 e.	15
Neah, Wash	1	6	24	29	n. 45 w.	7
Port Crescent, Wash.*	0	2	8	18	s. 79 w.	10
Seattle, Wash	12	34	16	6	s. 24 e.	24
Tacoma, Wash	8	33	7	25	s. 36 w.	31
Portland, Oreg	8	30	15	16	s. 3 w.	22
Roseburg, Oreg	17	14	14	22	n. 69 w.	8
Middle Pacific Coast Region.						
Eureka, Cal	27	15	12	24	n. 45 w.	17
Mount Tamalpais, Cal	38	1	0	33	n. 41 w.	50
Red Bluff, Cal	32	10	8	13	n. 13 w.	23
Sacramento, Cal	26	18	12	17	n. 32 w.	9
San Francisco, Cal	11	13	4	38	s. 87 w.	34
South Pacific Coast Region.						
Fresno, Cal	31	2	11	26	n. 28 w.	33
Los Angeles, Cal	10	18	3	37	s. 77 w.	35
San Diego, Cal	26	8	10	29	n. 47 w.	26
San Luis Obispo, Cal	34	3	4	18	n. 24 w.	34
West Indies.						
Basseterre, St. Kitts Island	17	1	49	0	n. 72 e.	52
Bridgetown, Barbados	12	3	50	0	n. 80 e.	51
Colon, U. S. C	41	4	22	9	n. 19 e.	39
Havana, Cuba	14	24	25	6	s. 62 e.	22
Kingston, Jamaica	36	3	29	3	n. 39 e.	42
Port of Spain, Trinidad	11	10	42	2	n. 88 e.	40
San Juan, Porto Rico	0	23	34	1	s. 55 e.	40
Santiago de Cuba, Cuba	25	19	19	7	n. 63 e.	13
Santo Domingo, Santo Domingo	39	6	14	3	n. 18 e.	35
Willemstad, Curaçao	4	1	55	0	n. 88 e.	55

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE VII.—*Thunderstorms and auroras, February, 1899.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	53	T.	....	8	5	5	3	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	1	2	....	....	2	6	....	....	....	....	....	35	10	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arizona	53	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Arkansas	57	T.	...	3	....	3	....	....	....	....	....	...	. ..	...	...	....	....	....	....	....	....	....	....	....	....	1	11	2	....	....	....	....	20	5	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
California	189	T.	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Colorado	73	T.	....	....	...	...	....	....	....	....	....	1	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	..	....	....	....	....	3	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Connecticut	22	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Delaware	5	T.	...	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Dist. of Columbia	4	T.	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Florida	45	T.	2	4	2	....	....	....	....	....	....	....	2	10	4	....	9	3	....	2	....	....	2	11	6	....	....	1	4	1	....	....	....	63	15	T.
		A.	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Georgia	54	T.	..	18	4	3	4	1	....	....	....	...	...	....	....	....	....	..	....	....	....	....	2	2	....	....	....	6	4	....	....	....	....	44	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Idaho	27	T.	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Illinois	92	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	5	2	....	....	8	....	....	....	....	....	....	15	3	T.
		A.	....	....	1	....	....	....	....	....	1	....	1	....	2	....	....	..	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	7	6	A.
Indiana	55	T.	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	..	....	1	1	....	....	....	....	....	2	9	....	....	....	....	....	15	3	T.
		A.	....	....	....	....	1	....	....	1	1	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	...	3	3	A.
Indian Territory	8	T.	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	..	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Iowa	126	T.	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2	1	T.
		A.	....	....	....	....	....	....	....	....	....	1	10	4	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	16	4	A.
Kansas	74	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	12	1	..	....	....	....	....	14	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Kentucky	45	T.	....	4	15	5	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	2	2	....	....	....	...	....	32	6	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Louisiana	45	T.	....	....	....	1	1	....	...	....	....	....	....	....	....	....	1	...	1	1	1	...	....	....	....	1	3	6	....	....	....	....	.	16	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Maine	17	T.	...	...	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	4	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	6	3	A.
Maryland	39	T.	.	....	29	....	....	....	....	....	.. ...	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	31	2	T.
		A.	1	....	....	....	....	....	....	....	....	...	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	A.
Massachusetts	54	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	. ..	..	2	...	....	....	....	2	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	4	2	A.
Michigan	107	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	29	....	....	....	....	....	30	2	T.
		A.	....	....	....	....	....	...	....	1	....	....	5	6	1	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	14	5	A.
Minnesota	64	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	1	....	....	12	5	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	....	....	....	21	6	A.
Mississippi	42	T.	....	5	6	7	....	2	....	....	....	....	....	....	....	....	3	....	1	....	....	....	1	....	....	....	6	6	....	....	....	....	....	37	9	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	0	0	A.
Missouri	89	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	5	....	....	....	39	2	....	....	....	....	....	46	3	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Montana	37	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	1	....	....	1	....	....	5	2	1	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	12	7	A.
Nebraska	145	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	5	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	7	3	A.
Nevada	45	T.	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Hampshire	20	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	...	....	....	....	. ..	....	....	....	....	....	6	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	2	A.
New Jersey	50	T.	....	....	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New Mexico	38	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	...	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
New York	103	T.	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	1	....	1	....	....	5	2	1	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	12	9	A.
North Carolina	56	T.	....	2	20	6	12	3	3	....	1	....	....	....	....	....	....	....	....	....	....	....	...	10	1	. ..	....	4	6	...	....	....	....	68	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
North Dakota	40	T.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1	..	....	....	....	....	....	....	....	....	....	2	2	T.
		A.	....	2	....	....	....	1	...	1	2	....	9	3	....	....	1	1	....	....	....	....	....	....	1	....	....	1	1	....	....	....	....	23	11	A.
Ohio	124	T.	..	..	17	....	..	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	15	....	....	....	....	....	34	3	T.
		A.	....	...	....	....	....	....	....	....	....	1	....	2	1	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	5	4	A.
Oklahoma	22	T.	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	10	....	....	....	....	....	....	10	1	T.
		A.	....	....	....	....	....	1	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Oregon	71	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Pennsylvania	100	T.	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	..	..	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Rhode Island	8	T.	....	...	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Carolina	44	T.	1	3	2	6	6	....	..	....	....	....	....	....	....	....	....	....	....	....	....	....	4	....	....	....	5	....	....	....	....	....	....	27	7	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
South Dakota	52	T.	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	..	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	9	2	1	....	....	1	....	....	....	....	....	....	....	....	....	....	2	....	....	..	...	15	5	A.
Tennessee	61	T.	....	4	31	14	9	2	...	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3	....	6	8	....	....	....	....	....	....	78	9	T
		A.	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	A.
Texas	83	T.	....	....	....	....	....	....	....	....	....	....	1	1	1	....	3	....	1	....	....	1	....	....	....	1	6	....	....	....	....	....	....	15	8	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Utah	34	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Vermont	14	T.	....	....	....	....	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	A.
Virginia	47	T.	....	....	18	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	22	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Washington	55	T.	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	1	A.
West Virginia	38	T.	....	....	17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	17	1	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1	1	A.
Wisconsin	60	T.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	T.
		A.	....	....	....	....	....	....	....	....	....	1	9	5	1	....	....	....	....	....	....	....	1	....	..	....	....	....	....	....	....	....	....	17	5	A.
Wyoming	18	T.	....	...	....	....	1	1	....	....	....	....	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	4	T.
		A.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0	A.
Sums	2,804	T.	4	52	190	52	41	10	3	0	1	1	7	12	5	0	19	4	3	4	2	3	19	38	10	3	108	102	14	1	....	....	....	708	....	T.
		A.	1	3	1	0	2	3	1	6	4	4	85	32	8	3	2	4	1	3	4	1	0	0	3	0	0	3	5	0	....	....	....	179	....	A.

TABLE VIII.—*Average hourly sunshine (in percentages), February, 1899.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour.																Hours of sunshine.			
		A. M.								P. M.								Total.			
		5	6	7	8	9	10	11	Noon	1	2	3	4	5	6	7	8	Actual.	Possible.	Percent of possible.	Personal estimate.
																		Hours.	*Hours.*		
Albany, N. Y	T.	.....	.....	38	29	38	55	66	71	75	76	70	48	30	15	.....	.....	158.5	295.4	54	30
Atlanta, Ga	T.	.....	.....	35	29	36	46	54	57	60	58	54	43	39	41	.....	.....	143.7	307.1	47	41
Atlantic City, N. J	P.	.....	.....	52	49	46	50	50	46	46	47	46	51	44	47	.....	.....	142.7	300.8	47	40
Baltimore, Md	T.	.....	.....	43	43	50	70	77	86	83	82	80	69	55	50	.....	.....	204.5	300.8	68	45
Binghamton, N. Y	T.	.....	.....	24	22	34	50	61	67	66	60	55	40	23	17	.....	.....	137.2	296.5	46	28
Bismarck, N. Dak	P.	.....	.....	62	74	75	66	68	61	55	61	61	49	26	29	.....	.....	167.9	288.7	58	58
Boise, Idaho	P.	.....	.....	33	38	42	42	48	49	41	40	39	44	44	38	.....	.....	124.5	293.8	42	43
Boston, Mass	T.	.....	.....	52	48	50	53	54	56	64	60	59	58	45	39	.....	.....	159.6	296.5	54	47
Buffalo, N. Y	T.	.....	.....	23	11	24	41	52	55	65	56	48	44	26	20	.....	.....	121.2	295.4	41	22
Charleston, S. C	T.	.....	.....	23	25	35	39	43	48	49	63	47	39	31	35	.....	.....	126.5	308.3	41	42
Chattanooga, Tenn	T.	.....	.....	19	22	32	45	46	47	47	50	48	49	29	26	.....	.....	122.1	305.8	40	41
Cheyenne, Wyo	P.	.....	.....	35	53	62	68	68	68	70	72	65	57	42	9	.....	.....	178.5	298.4	60	38
Chicago, Ill	T.	.....	.....	21	15	19	38	52	64	59	55	49	38	33	37	.....	.....	123.4	296.5	42	40
Cincinnati, Ohio	T.	.....	.....	38	40	40	41	46	53	53	48	48	44	36	39	.....	.....	133.6	300.8	44	43
Cleveland, Ohio	T.	.....	.....	3	18	18	20	24	18	22	20	15	14	11	12	.....	.....	51.2	296.5	17	31
Columbia, Mo	T.	.....	.....	45	65	67	75	79	75	74	72	70	62	56	51	.....	.....	204.9	300.8	68	42
Columbus, Ohio	T.	.....	.....	26	29	32	38	55	58	58	50	50	45	42	57	.....	.....	138.1	299.7	46	42
Denver, Colo	P.	.....	.....	63	64	75	81	92	88	90	90	85	65	49	28	.....	.....	225.0	299.7	75	56
Des Moines, Iowa	T.	.....	.....	21	37	45	62	68	77	84	84	76	59	50	41	.....	.....	186.2	296.5	63	50
Detroit, Mich	T.	.....	.....	0	6	15	35	45	61	55	55	48	35	22	19	.....	.....	109.1	296.5	37	32
Dodge, Kans	P.	.....	.....	67	63	68	82	84	82	79	76	76	72	60	54	.....	.....	220.8	302.3	73	58
Dubuque, Iowa	T.	.....	.....	24	39	43	62	70	77	77	78	72	59	46	38	.....	.....	180.6	296.5	61	58
Eastport, Me	P.	.....	.....	48	36	52	57	62	66	65	62	57	47	40	31	.....	.....	156.0	291.9	53	42
Erie, Pa	T.	.....	.....	31	17	23	38	46	57	59	54	47	34	32	32	.....	.....	118.8	296.5	40	28
Escanaba, Mich	T.	.....	.....	11	15	19	39	51	59	57	60	59	54	45	40	.....	.....	133.1	290.4	46	47
Eureka, Cal	P.	.....	.....	9	15	30	43	52	52	44	50	46	43	41	40	.....	.....	123.2	298.4	41	38
Fresno, Cal	T.	.....	.....	84	82	97	98	100	100	100	100	100	95	84	70	.....	.....	284.5	303.3	94	82
Galveston, Tex	P.	.....	.....	69	30	32	35	40	37	41	42	48	48	44	16	.....	.....	115.3	313.1	37	28
Grand Junction, Colo	P.	.....	.....	64	52	56	80	83	75	75	68	65	62	43	54	.....	.....	196.2	300.8	65	48
Harrisburg, Pa	T.	.....	.....	42	38	42	48	51	57	64	60	49	38	39	37	.....	.....	143.4	299.7	48	38
Helena, Mont	P.	.....	.....	25	30	35	44	42	29	36	38	44	40	36	38	.....	.....	107.8	288.7	37	32
Huron, S. Dak	T.	.....	.....	33	49	55	76	86	88	96	91	86	72	48	53	.....	.....	216.2	293.8	74	60
Idaho Falls, Idaho	T.	.....	.....	0	10	11	24	35	47	46	41	29	16	7	6	.....	.....	74.9	295.4	25	21
Indianapolis, Ind	T.	.....	.....	24	43	47	51	60	66	64	57	50	45	40	32	.....	.....	152.5	299.7	51	38
Jacksonville, Fla	T.	.....	.....	48	42	46	60	64	65	65	65	64	61	55	36	.....	.....	177.4	312.1	57	44
Kansas City, Mo	P.	.....	.....	52	55	56	55	64	63	54	61	56	56	55	60	.....	.....	172.5	300.8	57	50
Key West, Fla	T.	.....	.....	44	48	67	75	77	82	81	80	82	75	65	41	30	.....	220.4	317.0	70	56
Knoxville, Tenn	T.	.....	.....	28	29	35	42	48	50	51	49	53	52	44	43	.....	.....	137.0	305.0	45	38
Lexington, Ky	T.	.....	.....	28	34	36	46	51	54	57	56	54	52	38	28	.....	.....	139.7	302.3	46	36
Little Rock, Ark	T.	.....	.....	52	43	49	48	48	52	70	68	66	64	51	45	.....	.....	168.4	305.8	55	46
Los Angeles, Cal	P.	.....	.....	57	69	78	84	84	87	91	92	92	92	87	79	.....	.....	259.7	307.1	85	71
Louisville, Ky	T.	.....	.....	37	39	45	47	49	50	49	48	44	35	40	44	.....	.....	134.2	302.3	44	33
Meridian, Miss	T.	.....	.....	39	35	39	45	55	52	51	51	46	41	35	38	.....	.....	137.5	309.8	44	34
Minneapolis, Minn	T.	.....	.....	38	42	46	59	59	55	62	61	56	44	37	24	.....	.....	148.6	291.9	51	.....
Mount Tamalpais, Cal	P.	.....	.....	78	85	88	90	90	85	88	90	91	93	81	77	.....	.....	263.8	302.3	87	66
Nashville, Tenn	T.	.....	.....	19	21	30	39	41	45	43	45	50	45	31	37	.....	.....	117.5	305.0	39	36
New Orleans, La	T.	.....	.....	26	21	22	25	32	37	39	38	35	30	26	27	.....	.....	94.1	312.1	30	34
New York, N. Y	T.	.....	.....	35	32	43	50	63	61	60	58	59	52	40	25	.....	.....	150.3	298.4	50	45
Northfield, Vt	P.	.....	.....	42	33	42	46	53	54	49	54	48	40	29	30	.....	.....	129.9	293.8	44	35
Oklahoma, Okla	T.	.....	.....	62	49	59	65	71	71	74	72	71	66	54	60	.....	.....	198.1	305.8	65	62
Omaha, Nebr	P.	.....	.....	53	53	58	65	77	76	79	75	73	65	50	38	.....	.....	195.4	298.4	65	52
Parkersburg, W. Va	T.	.....	.....	29	25	28	40	52	57	56	49	45	40	29	23	.....	.....	122.8	300.8	41	35
Phenix, Ariz	P.	.....	.....	82	80	89	92	93	90	87	92	90	87	80	80	.....	.....	260.2	308.3	87	69
Philadelphia, Pa	T.	.....	.....	42	44	45	49	49	52	57	53	53	52	51	51	.....	.....	151.2	299.7	50	41
Pittsburg, Pa	T.	.....	.....	12	4	4	15	27	28	28	20	12	8	4	4	.....	.....	42.6	298.4	14	29
Portland, Me	T.	.....	.....	58	42	52	61	68	66	73	69	68	59	44	31	.....	.....	172.3	293.8	59	47
Portland, Oreg	T.	.....	.....	0	3	8	20	34	27	28	27	32	27	17	6	.....	.....	63.5	290.4	22	27
Raleigh, N. C	T.	.....	.....	29	22	38	46	49	56	61	58	52	45	36	33	.....	.....	137.5	305.0	45	43
Rochester, N. Y	T.	.....	.....	42	29	23	27	35	44	45	42	24	19	18	27	.....	.....	90.3	295.4	31	30
St. Louis, Mo	T.	.....	.....	21	36	52	72	76	74	72	69	70	67	54	48	.....	.....	188.5	300.8	63	49
St. Paul, Minn	P.	.....	.....	43	50	54	66	74	68	62	66	61	53	55	47	.....	.....	176.1	291.9	60	53
Salt Lake City, Utah	P.	.....	.....	26	22	25	38	45	46	38	38	43	46	30	21	.....	.....	107.9	298.4	36	45
San Diego, Cal	P.	.....	.....	47	54	63	79	79	88	88	89	88	84	79	78	.....	.....	241.0	308.3	78	75
San Francisco, Cal	T.	.....	.....	30	22	49	68	79	86	94	95	93	92	68	32	.....	.....	215.7	302.3	71	54
Santa Fe, N. Mex	P.	.....	.....	69	68	77	87	91	85	82	85	82	76	69	61	.....	.....	240.5	305.0	79	69
Savannah, Ga	T.	.....	.....	34	33	39	51	54	65	65	68	56	52	52	45	.....	.....	162.9	309.8	53	44
Seattle, Wash	T.	.....	.....	0	10	16	29	35	45	42	39	32	24	13	1	.....	.....	79.0	286.8	28	25
Spokane, Wash	T.	.....	.....	2	14	17	40	50	48	47	49	42	34	28	23	.....	.....	105.0	286.8	37	40
Tacoma, Wash	T.	.....	.....	19	10	12	23	34	39	40	43	35	21	11	10	.....	.....	76.0	288.7	26	19
Tampa, Fla	T.	.....	.....	37	30	35	50	54	61	66	63	65	59	53	54	0	.....	167.1	314.1	53	48
Topeka, Kans	T.	.....	.....	52	56	58	59	67	76	75	64	61	60	62	49	.....	.....	189.1	300.8	63	49
Vicksburg, Miss	T.	.....	.....	24	21	24	34	40	41	51	43	41	42	39	38	.....	.....	115.7	309.8	37	37
Washington, D. C	P.	.....	.....	43	36	39	54	53	53	53	57	54	44	39	43	.....	.....	143.6	300.8	48	43
Wilmington, N. C	T.	.....	.....	39	32	44	50	54	55	57	64	56	49	39	33	.....	.....	149.2	307.1	49	41
Yankton, S. Dak	T.	.....	.....	38	47	64	81	91	89	89	84	89	80	61	27	.....	.....	221.3	295.4	75	48
Basseterre, St. Kitts	T.	.....	.....	14	19	49	68	86	85	90	91	80	74	55	18	0	.....	202.5	325.0	62	41
Bridgetown, Barbados	T.	.....	.....	25	38	51	60	59	50	45	43	45	36	30	20	15	.....	138.5	328.4	42	34
Colon, United States of Columbia	T.	.....	.....	18	31	23	48	66	64	66	56	50	38	39	39	29	.....	150.0	351.9	45	37
Havana, Cuba	T.	.....	.....	49	45	49	58	70	66	63	54	59	50	39	42	0	.....	172.6	319.8	54	50
Kingston, Jamaica, W. I	T.	.....	.....	76	73	73	75	67	71	74	77	66	50	46	23	22	.....	206.2	324.0	64	47
Port of Spain, Trinidad, W. I	T.	.....	.....	46	66	87	98	96	95	94	92	88	88	72	53	64	.....	271.5	330.5	82	45
San Juan, Porto Rico	T.	.....	.....	21	42	70	84	85	84	82	85	91	80	66	45	22	.....	231.5	324.0	71	68
Santiago de Cuba, Cuba	T.	.....	.....	78	79	82	81	85	90	90	89	87	75	66	63	87	.....	259.4	322.4	80	69
Santo Domingo, Santo Domingo, W. I	T.	.....	.....	72	61	61	82	71	71	75	71	68	59	50	48	56	.....	211.9	324.0	65	61
Willemstad, Curaçao	T.	.....	.....	22	76	94	89	90	94	96	94	96	97	93	70	34	.....	281.8	329.2	86	64

TABLE IX.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during February, 1899, at all stations furnished with self-registering gauges.*

Stations.	Date.	Total duration.		Total am't of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time as indicated.												
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	13-14			1.35														*			
Atlanta, Ga.	26	4.00 a. m.	10.30 p. m.	2.78	1.17 p. m.	1.40 p. m.	0.11	0.16	0.33	0.45	0.56	0.65	0.68	0.71	0.74						
Atlantic City, N. J.	26-27			0.72														0.23			
Baltimore, Md.	11-13			1.55														*			
Binghamton, N. Y.	7-8			0.77														*			
Bismarck, N. Dak.	27			0.08														*			
Boise, Idaho	7-8			1.12														*			
Boston, Mass.	12-14			1.08														*			
Buffalo, N. Y	21-22			0.51														0.12			
Cairo, Ill.	25-26			1.60														0.34			
Charleston, S. C.	15-16			1.39														0.44			
Chicago, Ill.	25-26			0.98														*			
Cincinnati, Ohio	3			0.59														0.27			
Cleveland, Ohio	21-22			0.85														0.22			
Columbia, Mo.	25			1.43														0.38			
Columbus, Ohio	26			0.51														*			
Denver, Colo.	24-25			0.27														*			
Des Moines, Iowa	25-26			0.45														0.09			
Detroit, Mich.	25-26			0.49														0.31			
Dodge, Kans	5-6			0.09														*			
Duluth, Minn.	25-26			0.64														*			
Eastport, Me.	13-14			1.22														*			
Erie, Pa.	21-22			0.51														*			
Escanaba, Mich.	25-26			0.81														*			
Fort Worth, Tex.	25			0.09														0.09			
Fresno, Cal.	2			0.02									0.02								
Galveston, Tex.	14-15			1.98														0.38			
Hannibal, Mo.	25			1.38														*			
Harrisburg, Pa.	26			1.04														0.17			
Hatteras, N. C.	27	6.15 a. m.	7.15 p. m.	3.81	6.40 a. m.	7.30 a. m.	0.04	0.04	0.09	0.16	0.21	0.36	0.44	0.56	0.69	0.77	0.83				
					7.30 a. m.	8.20 a. m.		0.95	1.05	1.07	1.08	1.09	1.10	1.11	1.27	1.38	1.56				
					8.30 a. m.	9.40 a. m.		1.60	1.69	1.79	1.92	2.03	2.13	2.26	2.39	2.56	2.76	2.98	3.31		
Huron, S. Dak.	1			0.16														*			
Idaho Falls, Idaho	7-8			0.29														*			
Indianapolis, Ind.	25-26			0.82														0.26			
Jacksonville, Fla.	15			1.54														0.58			
Jupiter, Fla.	27	5.50 p. m.	7.45 p. m.	1.78	6.25 p. m.	7.00 p. m.	0.04	0.05	0.46	0.91	1.21	1.45	1.59	1.66	1.69	1.71					
Kansas City, Mo.	25-26			1.19														0.27			
Key West, Fla.	12-13	8.45 p. m.	D. N.	1.56	10.00 p. m.	10.45 p. m.	0.15	0.03	0.10	0.25	0.40	0.52	0.65	0.71	0.82	0.86					
Knoxville, Tenn.	3-4			1.48														0.55			
Lincoln, Nebr.	25			0.44														*			
Little Rock, Ark.	24-25			1.10														0.45			
Los Angeles, Cal.	1-2			0.02																	
Louisville, Ky.	25-26			0.40														0.21			
Memphis, Tenn.	25	5.40 p. m.	10.30 p. m.	1.06	9.05 p. m.	9.15 p. m.	0.38	0.27	0.52	0.55	0.57	0.58	0.60	0.62	0.64						
Meridian, Miss	2			1.22														0.41			
Milwaukee, Wis.	25-26			0.50														0.06			
Montgomery, Ala.	26	1.07 p. m.	7.50 p. m.	1.83	4.40 p. m.	5.25 p. m.	0.40	0.18	0.39	0.68	0.90	1.06	1.10	1.14	1.22	1.30					
Nantucket, Mass.	12-13			1.46														*			
Nashville, Tenn.	25-26			2.17														*			
New Orleans, La.	20-21			0.85														0.27			
New York, N. Y.	26-27			1.05														0.24			
Norfolk, Va.	27			0.57														0.54			
Northfield, Vt.	13-14			0.66														*			
Oklahoma, Okla.	25			0.36														*			
Omaha, Nebr.	25-26			0.60														0.10			
Parkersburg, W. Va.	3			0.55														0.21			
Philadelphia, Pa.	26-27			1.19														0.20			
Pittsburg, Pa.	26			0.48														*			
Portland, Me.	13-14			1.80														*			
Portland, Oreg.	26-27			0.50														0.21			
Raleigh, N. C.	16			1.27														0.32			
Richmond, Va.	5			0.84														0.40			
Rochester, N. Y.	7-8			0.90														*			
St. Louis, Mo.	25-26			2.46														0.40			
St. Paul, Minn.	25-26			0.55														0.08			
Salt Lake City, Utah	7-8			0.87														*			
San Diego, Cal.	1-2			0.22														*			
San Francisco, Cal.	1			0.08														0.06			
Savannah, Ga.	15-16			2.15														0.60			
Seattle, Wash.	12			0.34														0.20			
Spokane, Wash.	14			0.40														*			
Tampa, Fla.	15-16	9.37 p. m.	3.00 a. m.	1.63	10.30 p. m.	11.45 p. m.	0.10	0.07	0.19	0.29	0.38	0.44	0.53	0.59	0.70	0.80	0.85	0.96	1.25		
Vicksburg, Miss.	25-26	9.00 p. m.	1.30 a. m.	1.37	12.21 a. m.	12.40 a. m.	0.30	0.13	0.46	0.67	0.88	0.89	0.93	1.01	1.03	1.04	1.06	1.15			
Washington, D. C.	16-17			1.57														0.36			
Wilmington, N. C.	27			0.79														0.38			
Yankton, S. Dak.	25-26			0.27														*			
Basseterre, St. Kitts	28			0.34														0.20			
Bridgetown, Barbados	1			0.41														0.37			
Colon, U. S. C.	6	6.40 a. m.	8.12 a. m.	0.78	7.36 a. m.	8.01 a. m.	0.01	0.14	0.19	0.38	0.69	0.76									
Do	11	6.05 a. m.	7.40 a. m.	1.77	6.15 a. m.	7.05 a. m.	0.02	0.09	0.17	0.29	0.56	0.72	0.94	1.17	1.36	1.56	1.72				
Do	16	1.50 p. m.	4.10 p. m.	1.38	2.48 p. m.	3.18 p. m.	0.02	0.24	0.53	0.87	1.14	1.26	1.30								
Havana, Cuba	12-13	10.40 p. m.	D. N.	0.92	11.30 p. m.	11.55 p. m.	0.15	0.12	0.30	0.46	0.52	0.59	0.62	0.65	0.67	0.69	0.70				
Kingston, Jamaica	17			0.09														0.09			
Port of Spain, Trin.	18			0.37														0.11			
Roseau, Dominica																					
San Juan, Porto Rico	24			0.15														0.15			
Santiago de Cuba	13			0.26														0.24			
Santo Domingo, S. D.	12-13			0.55														0.21			
Willemstad, Curaçao	27			0.17											0.17						

*Record incomplete on account of snow or other causes.

TABLE X.—*Excessive precipitation, by stations, for February, 1899.*

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Bridgeport		2.80	3			
Clanton		6.30	26			
Hamilton		2.63	3			
Do		2.60	24-25			
Marion		7.00	24-25			
Montgomery				1.30	0 45	26
Newbern		3.90	26			
Newton		3.35	5			
Pushmataha		4.65	26			
Uniontown		5.60	25-26			
Alaska.						
Sitka	10.38					
Arkansas.						
Jonesboro		3.00	25			
New Gascony		2.52	25			
Osceola		2.52	25			
California.						
Crescent City	10.95	7.10	28			
Eureka		3.17	27-28			
Florida.						
Brooksville		4.99	22-23			
DeFuniak Springs		3.15	26			
Earnestville		2.50	18			
Do.		4.25	22-23			
Eustis		3.97	22-23			
Jupiter				1.72	1 00	27
Kissimmee	11.53	4.75	22			
Myers		6.05	15			
New Smyrna		2.50	12			
Do		3.20	22			
Orange City		3.47	22			
Plant City		4.05	22			
St. Francis		4.70	22			
St. Francis Barracks		4.55	3			
Tampa				1.00	1 00	15
Tarpon Springs		5.43	22			
Georgia.						
Americus		2.70	27			
Athens		2.50	26			
Atlanta		2.78	26			
Augusta	10.54	3.32	6-7			
Blakely		2.52	26			
Clayton	10.10	3.40	26			
Columbus		3.00	6-7			
Covington		2.60	26			
Dahlonega		2.53	26			
Diamond	10.32	2.51	6			
Dublin		3.24	26-27			
Elberton		2.98	26-27			
Gainesville		2.70	27			
Gillsville		2.59	26			
Greenbush		3.27	3-4			
Jesup		3.50	13			
Marietta		3.70	26			
Mauzy		2.78	2	1.47	0 30	2
Point Peter		3.00	26			
Ramsey		2.55	4			
Tallapoosa		2.85	26			
Louisiana.						
Lawrence		2.60	20			
Shellbeach		2.65	14			
Maryland.						
Charlotte Hall		3.00	12-13			
Mississippi.						
Vicksburg				1.03	0 30	25
Water Valley				1.36	0 10	25
Windham		2.93	26			
North Carolina.						
Fayetteville	10.10					
Flatrock	10.82	3.16	26			
Greensboro		2.52	4			
Hatteras		3.81	27	2.75	2 25	27
Hendersonville		3.10	26			
Horse Cove	13.10	3.15	3			
Do		2.74	6			
Do		4.00	25-26			
Marion	10.05	3.19	26			

TABLE X.—*Excessive precipitation*—Continued.

Stations.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
North Carolina—Continued.	*Inches.*	*Inches.*		*Ins.*	*h. m.*	
Mount Pleasant		3.24	6			
Murphy	10.24	3.05	3-4			
Pantego	10.65					
Rockingham		2.95	7			
Sloan		2.88	26-27			
Waynesville	10.73	2.55	4			
Oregon.						
Astoria	12.52					
Bandon		3.30	28			
Bay City	16.89	8.52	7-9			
Cascade Locks	13.93	2.66	28			
Comstock		2.75	28			
Coquille River		2.64	28			
Fairview	10.66					
Falls City	11.19	4.05	28			
Gardiner	11.74	3.30	28			
Glenora	19.19	3.00	8			
Do		2.72	27			
Government Camp	22.22	2.90	8			
Do		2.71	23			
Do		3.80	28			
Kerby		5.63	28			
Langlois		5.40	28			
Merlin		2.68	28			
Monroe		2.50	28			
Nehalem	20.79	7.90	7-8			
Newport	12.59	4.00	8			
Placer		5.27	27-28			
Roseburg		4.15	28			
Toledo	14.80	4.00	8			
Do		2.60	28			
Williams		3.26	28			
Winona		3.33	28			
Pennsylvania.						
Coatesville	10.22	3.53	13			
South Carolina.						
Batesburg	11.23	4.00	15-16			
Cheraw	10.54	2.70	26-27			
Greenwood		3.00	26-27			
Holland		3.50	26			
Longshore		2.71	26-27			
Mount Carmel		2.63	26-27			
Society Hill	10.21	3.20	26			
Trenton	10.30	2.80	6			
Do		2.93	26-27			
Winnsboro		3.00	26			
Yemassee		2.60	15-16			
Tennessee.						
Charleston		3.53	3-4			
Harriman		2.70	26			
Hohenwald		2.52	26			
Lafayette		2.75	26			
Lynnville		2.76	26			
McMinnville		2.70	26			
Madison		2.56	26			
Oakhill	14.15	5.65	3-4			
Do		2.99	26			
Sewanee		3.55	26			
Tracy City		3.68	26			
Washington.						
Aberdeen	12.45					
Ashford	11.04					
Cedarlake	19.04					
Clearwater	20.99	3.20	14			
Do		2.75	17			
Fort Canby	11.83	3.21	7-8			
Monte Cristo	15.07					
Neah	16.22	3.06	13-14			
Do		3.02	16-17			
Northbend	11.06					
Southbend	12.88					
Tunnel	22.80	2.70	19			
Do		14.70	25-28			
West Indies.						
Colon				1.72	0 50	11
Do				1.28	0 25	16

TABLE XI.—*Data furnished by the Canadian Meteorological Service, February*, 1899.

Stations.	Pressure.			Temperature.				Precipitation.			Stations.	Pressure.			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.		Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*		*Ins.*	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	29.43	29.58	—.34	17.1	— 4.9	34 0	10.2	3.80	.....	24.0	Saugeen, Ont.	29.26	30.03	—.03	15.8	— 4.1	23.9	7.6	2.65	+0.21	18.6
Sydney, C. B. I.	29.74	29.78	—.17	16.7	— 2.6	24.6	8.9	2.82	—1.37	16.0	Parry Sound, Ont.	29.25	30.00	—.07	11.0	— 3.3	23.9	— 1.9	2.76	+0.36	23.0
Halifax, N. S.	29.75	29.89	—.09	22.8	+ 0.4	30.3	15.4	3.61	—1.09	22.8	Port Arthur, Ont.	29.23	30.00	—.09	1.4	— 5.0	12.1	— 9.4	0.57	—0.76	5.7
Grand Manan, N. B.	29.83	29.88	—.10	22.5	— 0.9	28.5	16.4	3.45	—0.11	19.5	Winnipeg, Man.	29.17	30.09	—.08	—6.9	— 5.3	3.7	—17.4	0.84	—0.33	8.4
Yarmouth, N. S.	29.81	29.89	—.15	24.0	— 1.8	30.1	17.9	3.40	—2.42	25.8	Minnedosa, Man.	28.11	30.13	— 03	—8.8	— 6.1	1.4	—19.1	0.35	—0.63	3.5
Charlottet'n, P. E. I.	29.76	29.80	—.12	16.2	— 1.4	23.3	9.0	3.29	—0.41	22.6	Qu'Appelle, Assin.	27.64	30.14	—.01	—7.7	— 7.1	0.8	—16.1	0.21	—0.46	2.1
Chatham, N. B.	29.81	29.83	—.15	12.5	0.0	22.6	2.3	2.89	—0.42	37.1	Medicine Hat, Assin.	27.68	30.18	+.03	2.2	— 9.0	12.4	— 7.8	1.13	+0.69	11.3
Father Point, Que.	29.83	29.86	—.14	11.7	+ 0.2	19.8	3.6	1.71	+0.09	17.1	Swift Current, Assin.	27.39	30.21	+.06	—2.5	10.5	6.1	—11.1	0.30	—0.46	3.0
Quebec, Que.	29.58	29.94	—.10	12.1	+ 0.3	19.1	5.1	3.35	—0.04	24.9	Calgary, Alberta	26.31	30.12	+.02	2.4	—11.1	11.4	— 6.5	0.30	—0.46	3.0
Montreal, Que.	29.75	29.97	—.08	15.8	+ 1.3	21.9	9.7	1.63	—1.19	9.1	Banff, Alberta	25.21	30.15	. ....	6.8	.....	17.7	— 4.2	0.30	.....	2.8
Rockliffe, Ont.	29.44	29.99	—.07	8.3	— 1.3	21.8	— 5.1	0.74	—1.58	7.2	Edmonton, Alberta	27.64	30.14	+.03	2.8	— 5.5	12.2	— 6.5	0.21	—0.25	1.4
Ottawa, Ont.	29.65	29.99	.....	12.4	+ 0.7	21.3	3.5	0.87	.....	5.8	Prince Albert, Sask.	28.39	30.06	.....	—7.2	— 4.2	4.0	—18.4	0.04	.....	0.4
Kingston, Ont.	29.67	30.01	—.07	17.0	— 0.8	24.6	9.3	1.22	—1.22	5.8	Battleford, Sask.	28.27	30.20	.....	—6.4	— 6.5	3.3	—16.0	0.06	.....	0.2
Toronto, Ont.	29.63	30.04	—.05	19.5	— 2.0	26.7	12.3	1.73	—0.58	5.5	Kamloops, B. C.	.....	.....	....	.....	.....	.....	.....	.....	.....	....
White River, Ont.	28.55	30.03	—.05	—2.5	— 2.7	13.1	—18.2	1.72	+0.50	17.2	Esquimalt, B. C.	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
Port Stanley, Ont.	29.38	30.06	—.03	17.1	— 5.7	24.7	9.5	1.82	—1.10	5.4	Hamilton, Bermuda.	29.96	30.12	+.04	64.2	+ 2.7	69.0	59.5	4.09	.....	

Chart I. Tracks of Centers of High Areas. February, 1899.

Chart I. Tracks of Centers of High Areas. February, 1899.

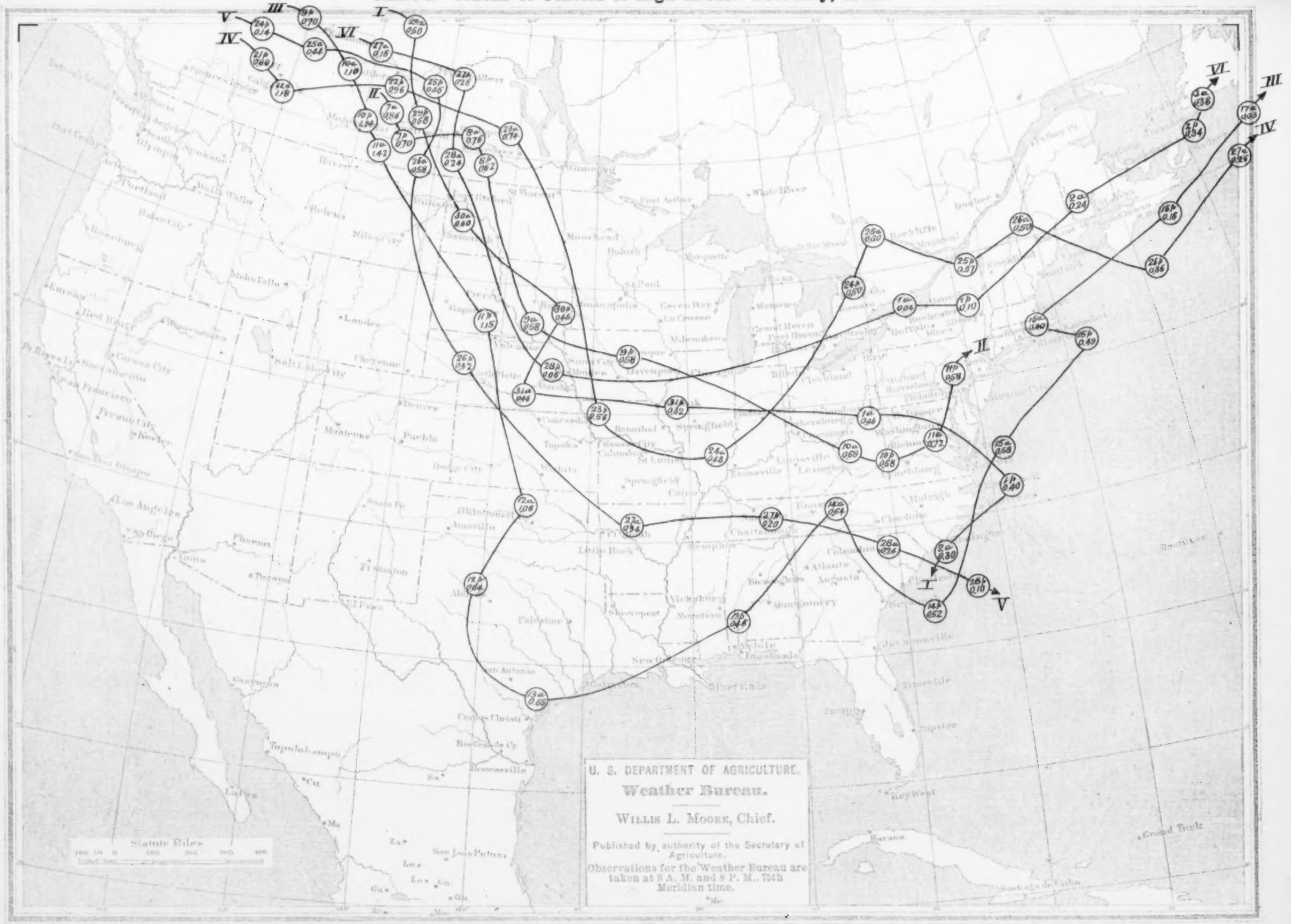


Chart II. Tracks of Centers of Low Areas. February, 1899.

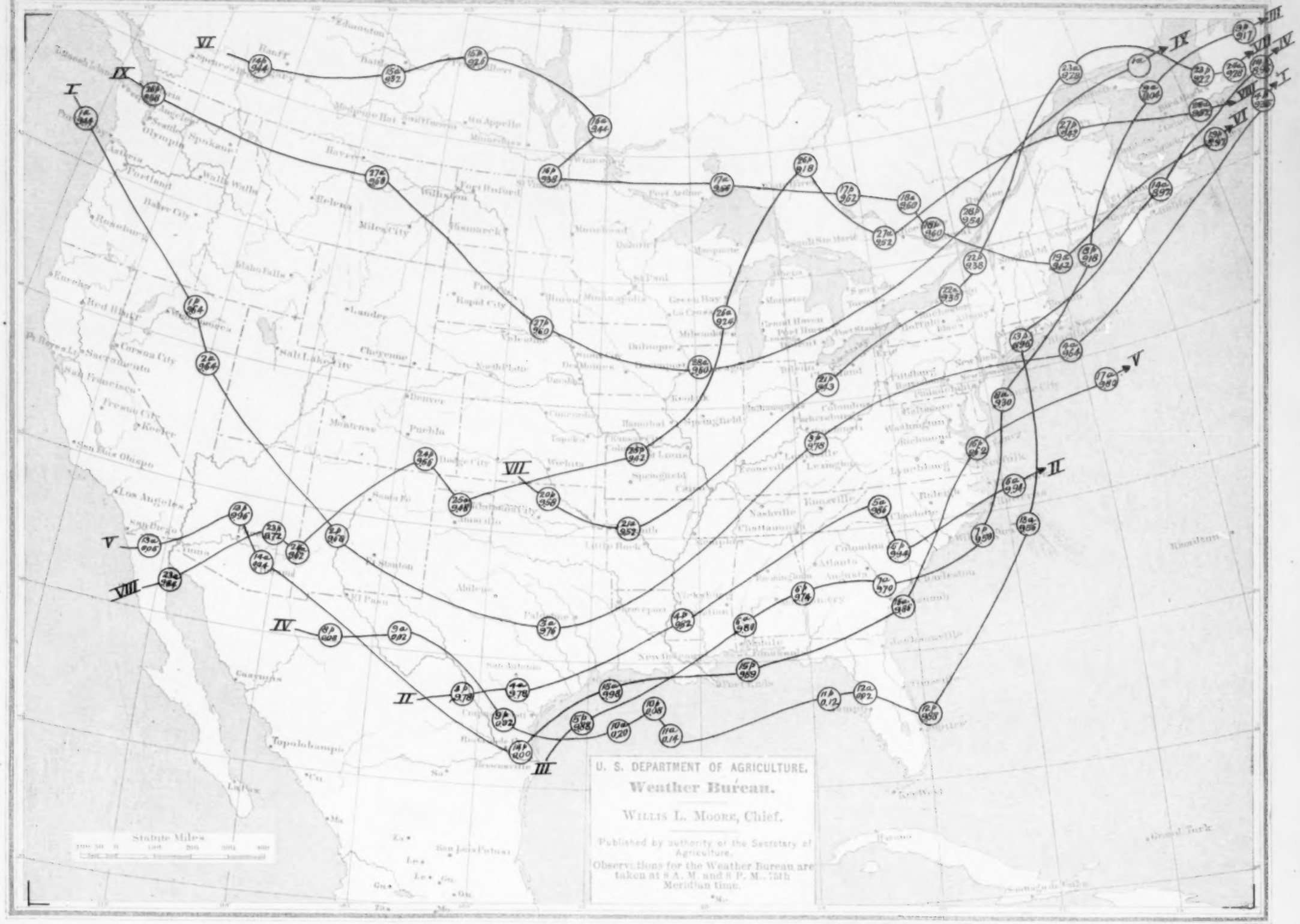


Chart III. Total Precipitation. February, 1899.

Chart III. Total Precipitation. February, 1899.

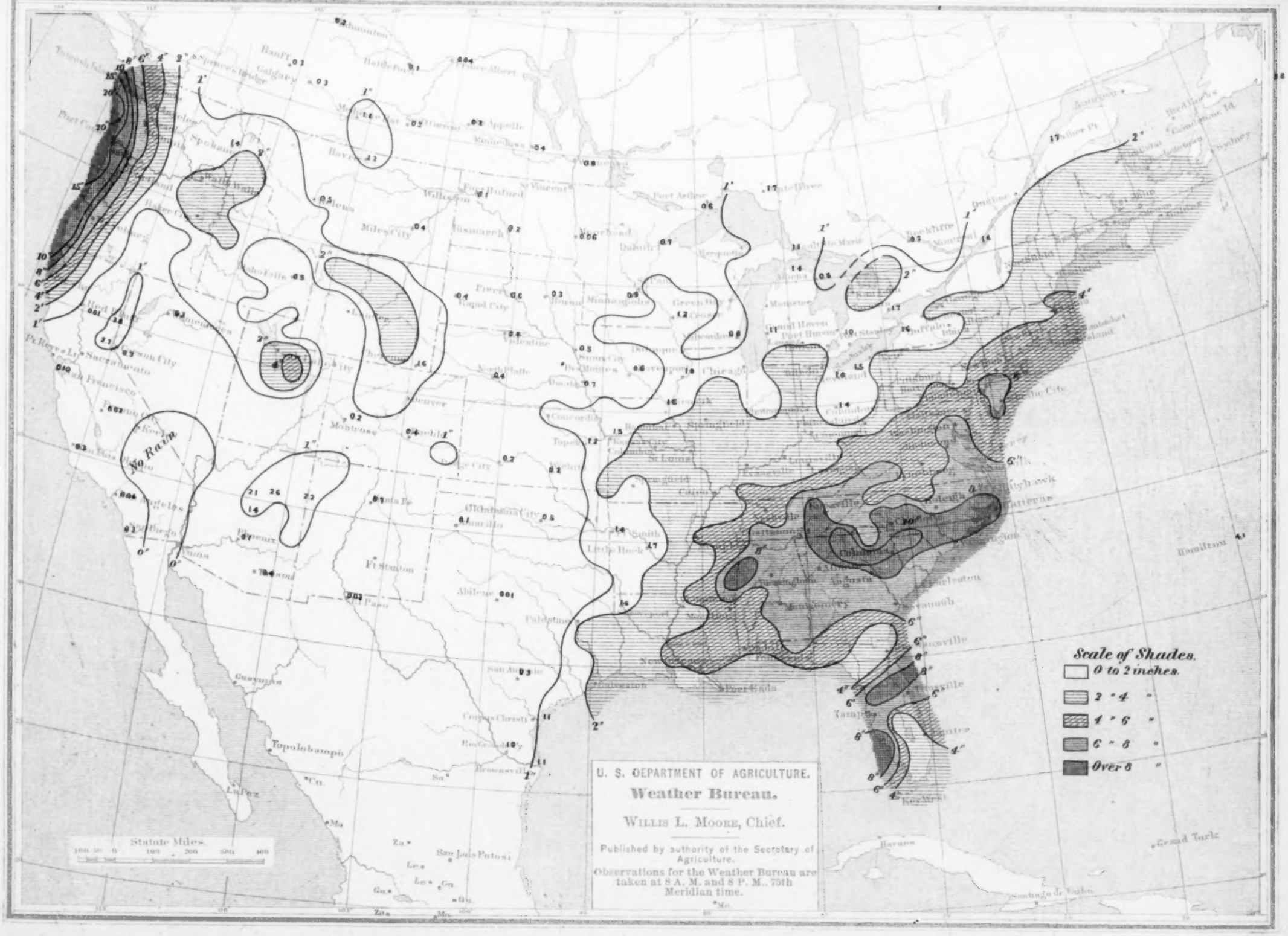
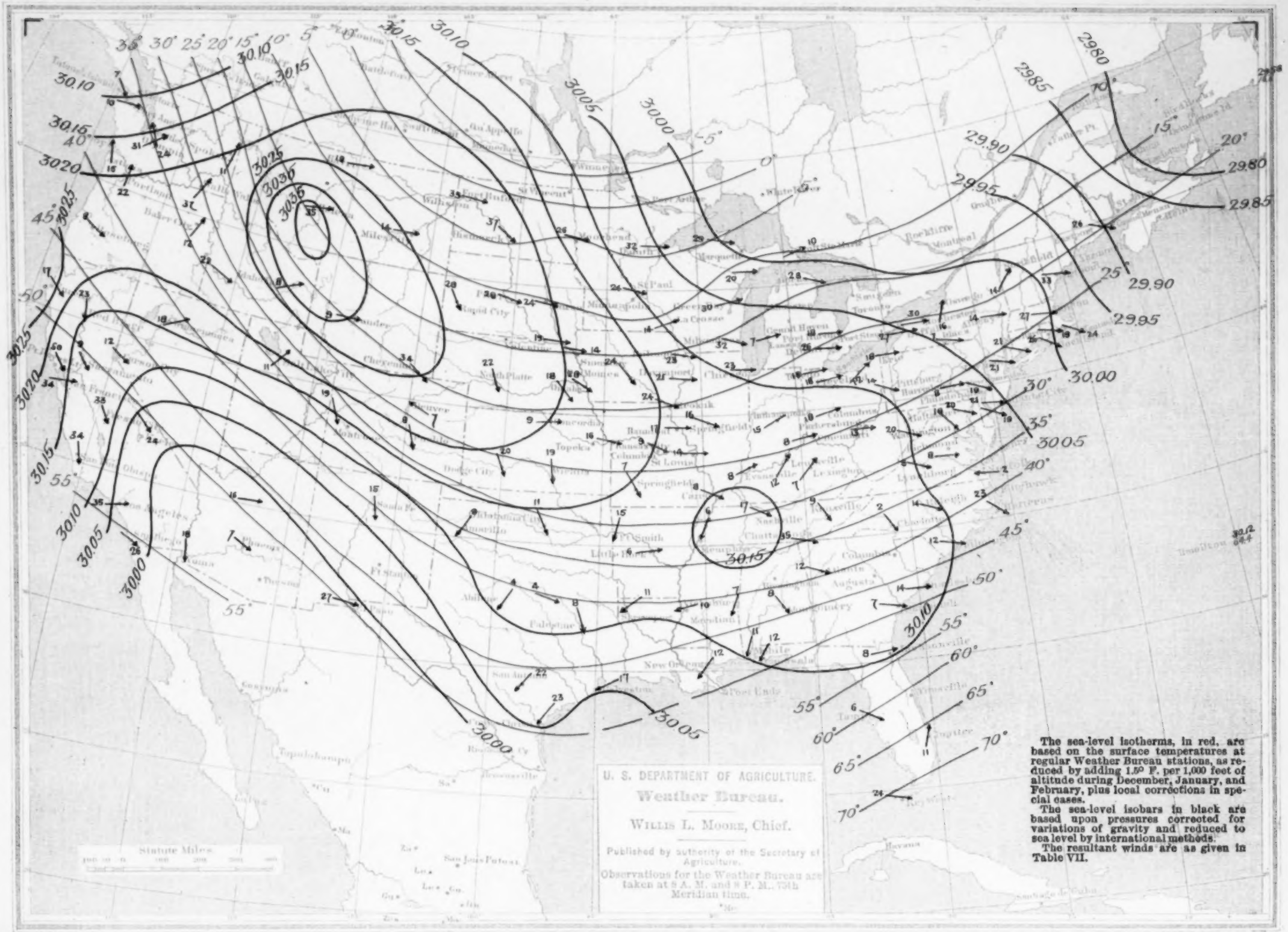


Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. February, 1899.



The sea-level isotherms, in red, are based on the surface temperatures at regular Weather Bureau stations, as reduced by adding 1.5° F. per 1,000 feet of altitude during December, January, and February, plus local corrections in special cases.

The sea-level isobars in black are based upon pressures corrected for variations of gravity and reduced to sea level by international methods.

The resultant winds are as given in Table VII.

Chart V. Hydrographs for Seven Principal Rivers of the United States. February, 1899.

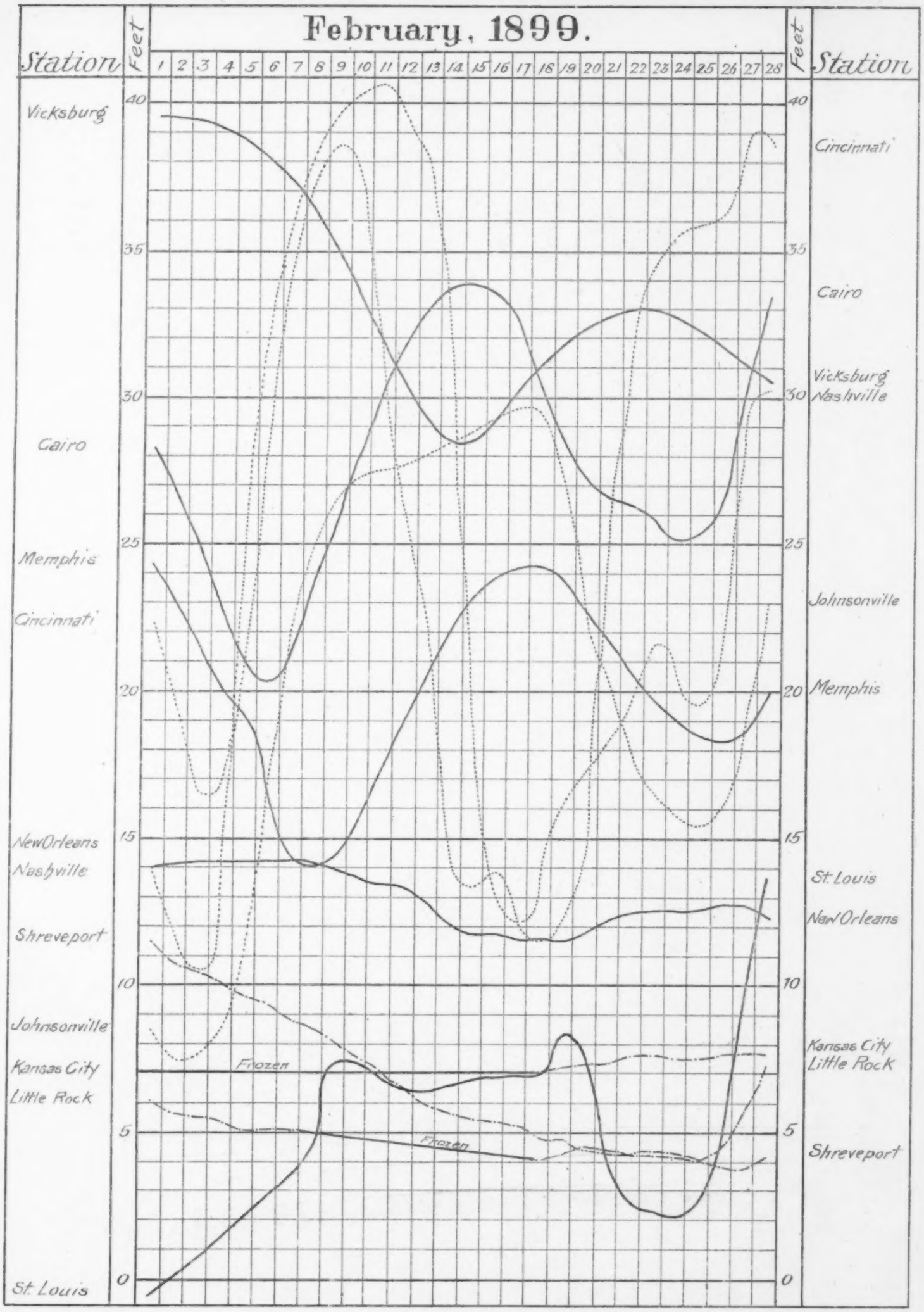


Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. February, 1899.

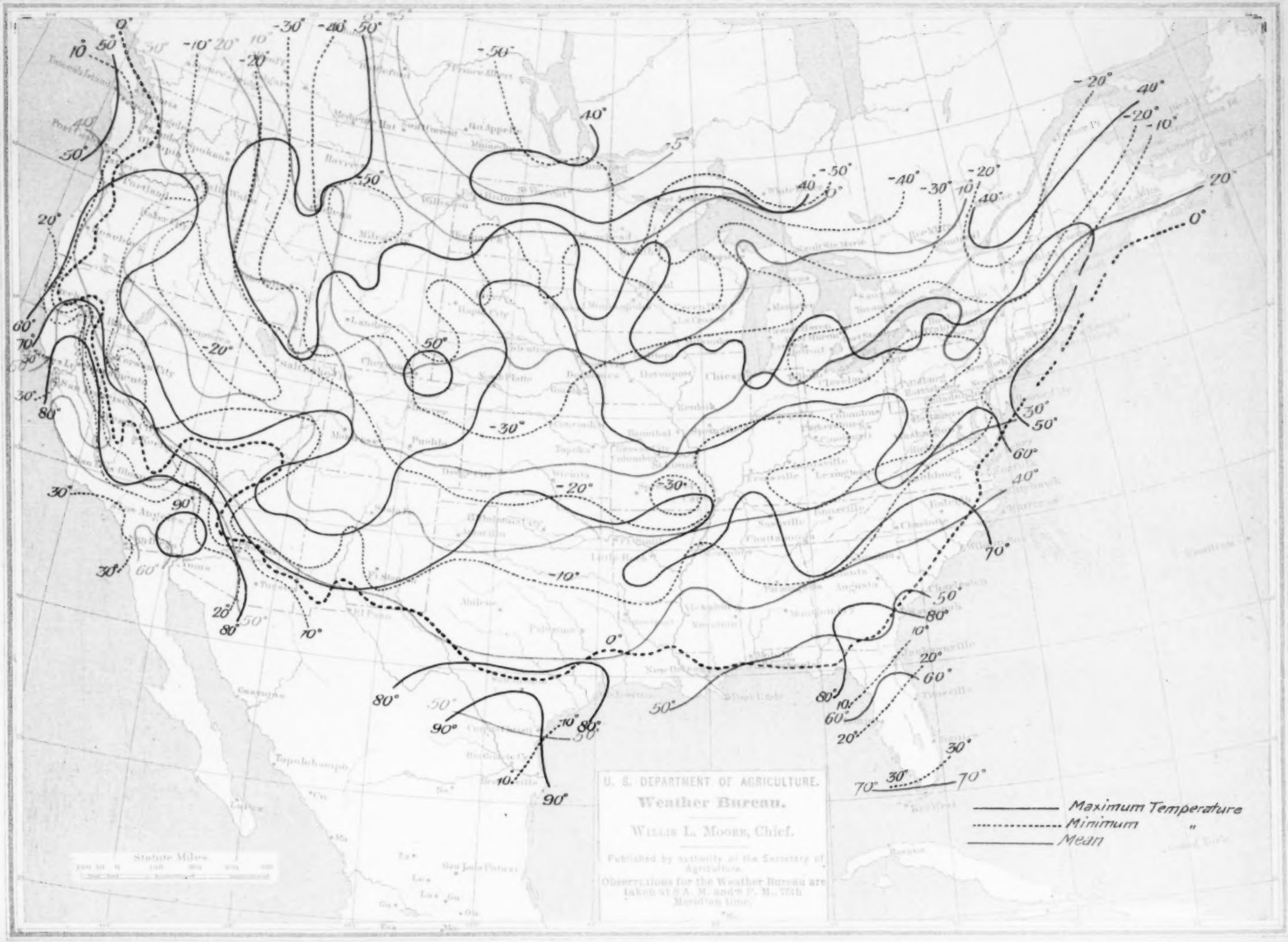


Chart VII. Percentage of Sunshine. February, 1899.

Chart VII. Percentage of Sunshine. February, 1899.

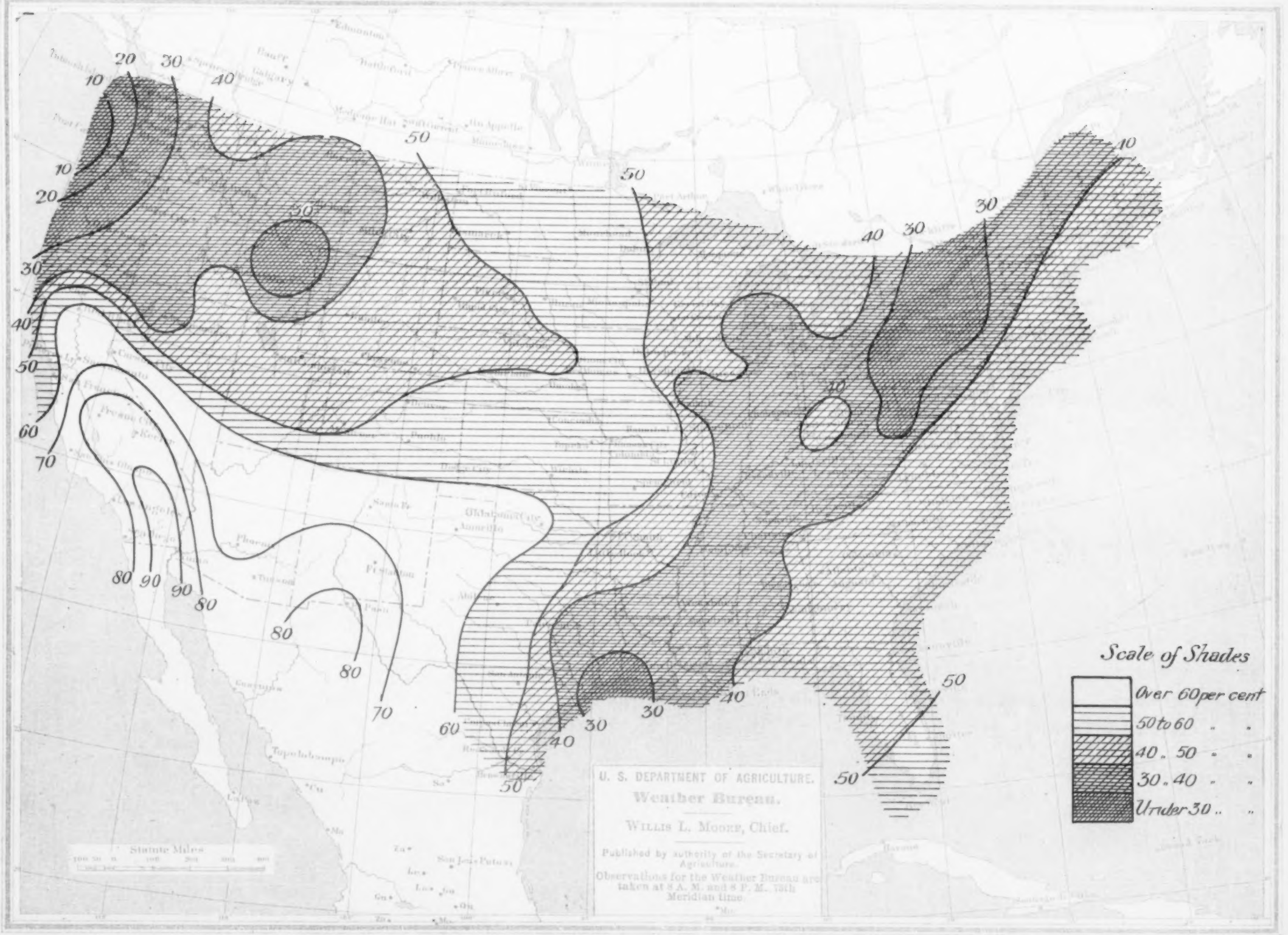


Chart VIII. Total Snowfall. February, 1899.

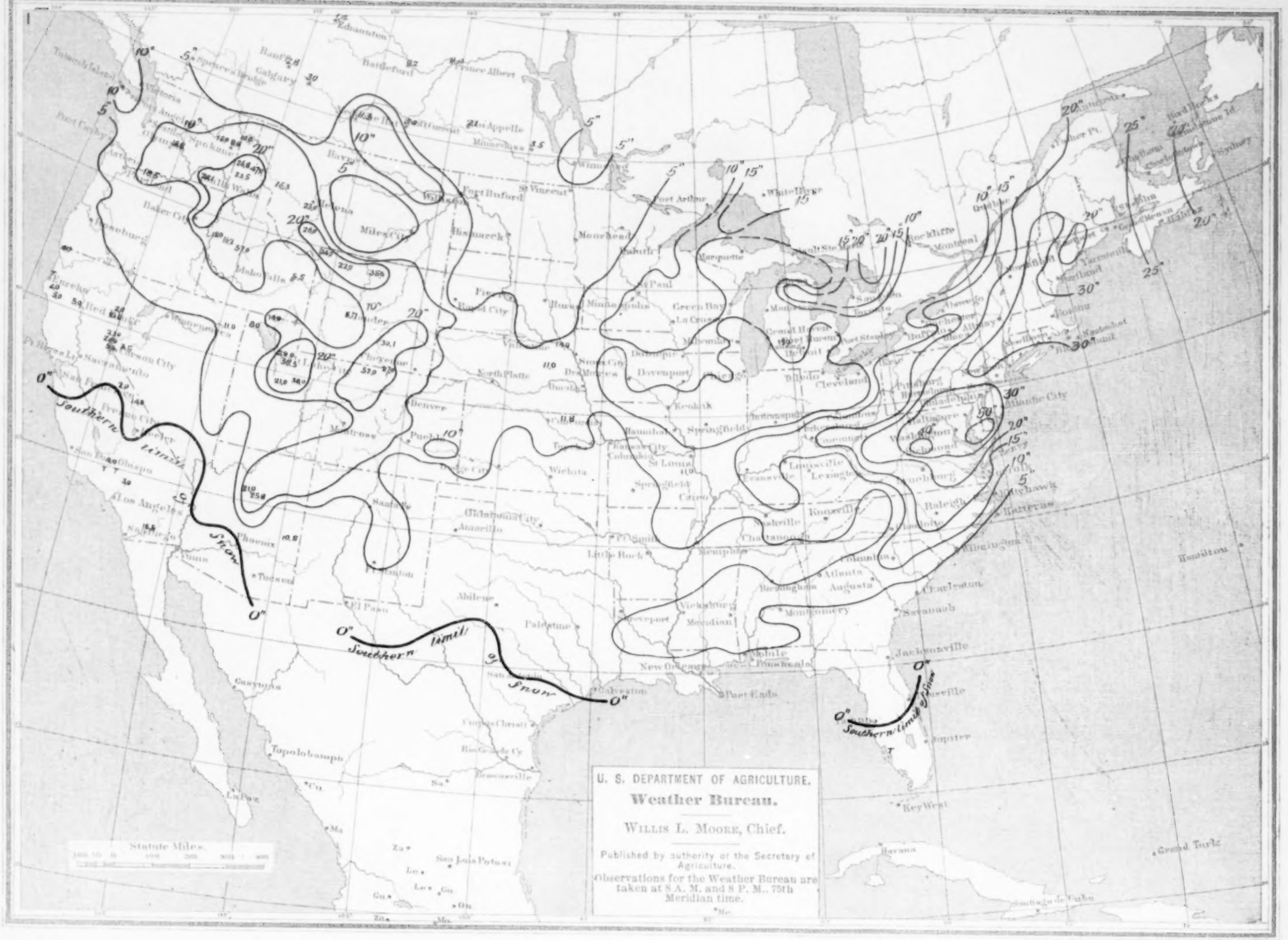


Chart IX. Snow on Ground at the End of the Month. February, 1899.

Chart IX. Snow on Ground at the End of the Month. February, 1899.

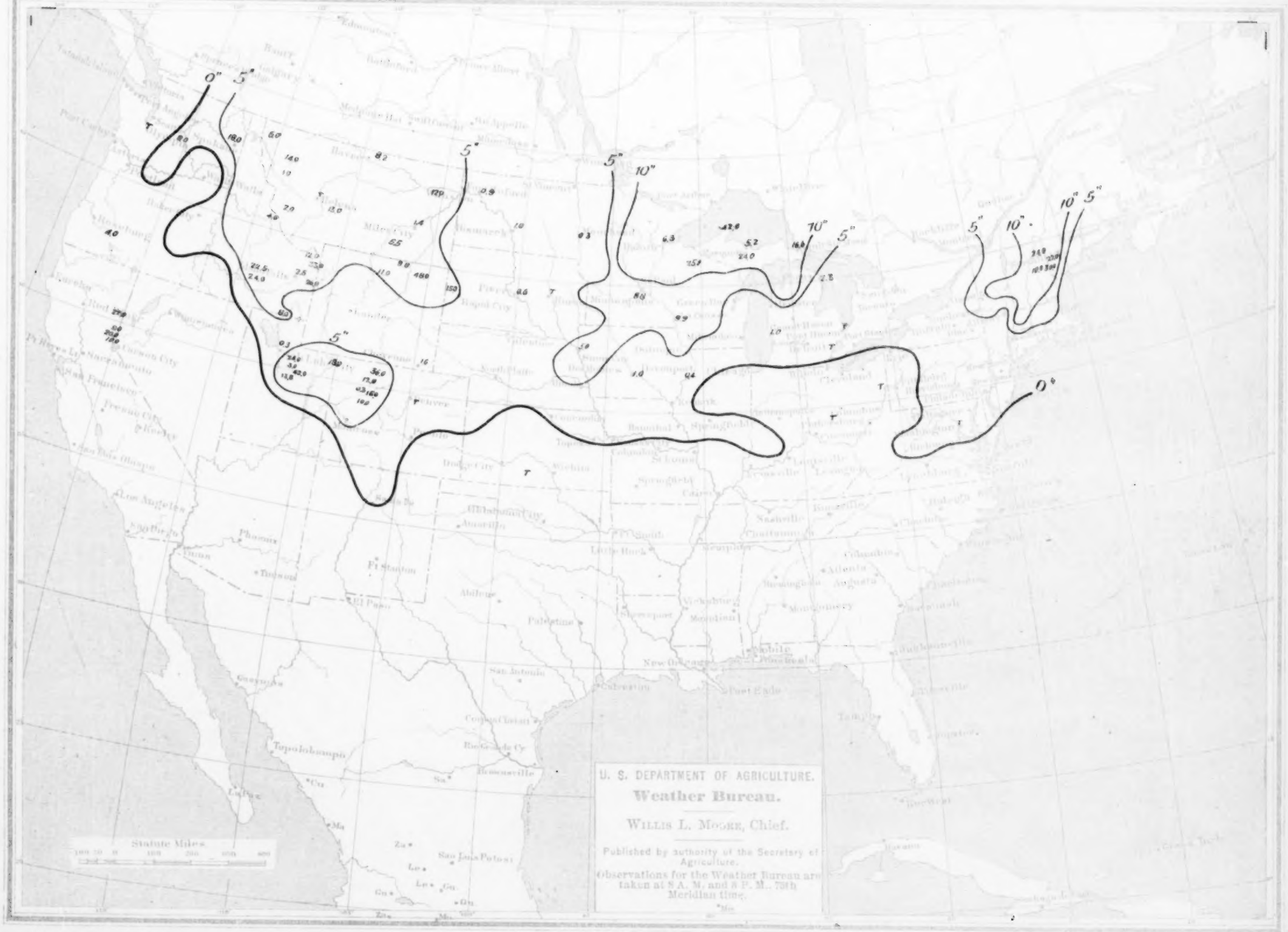
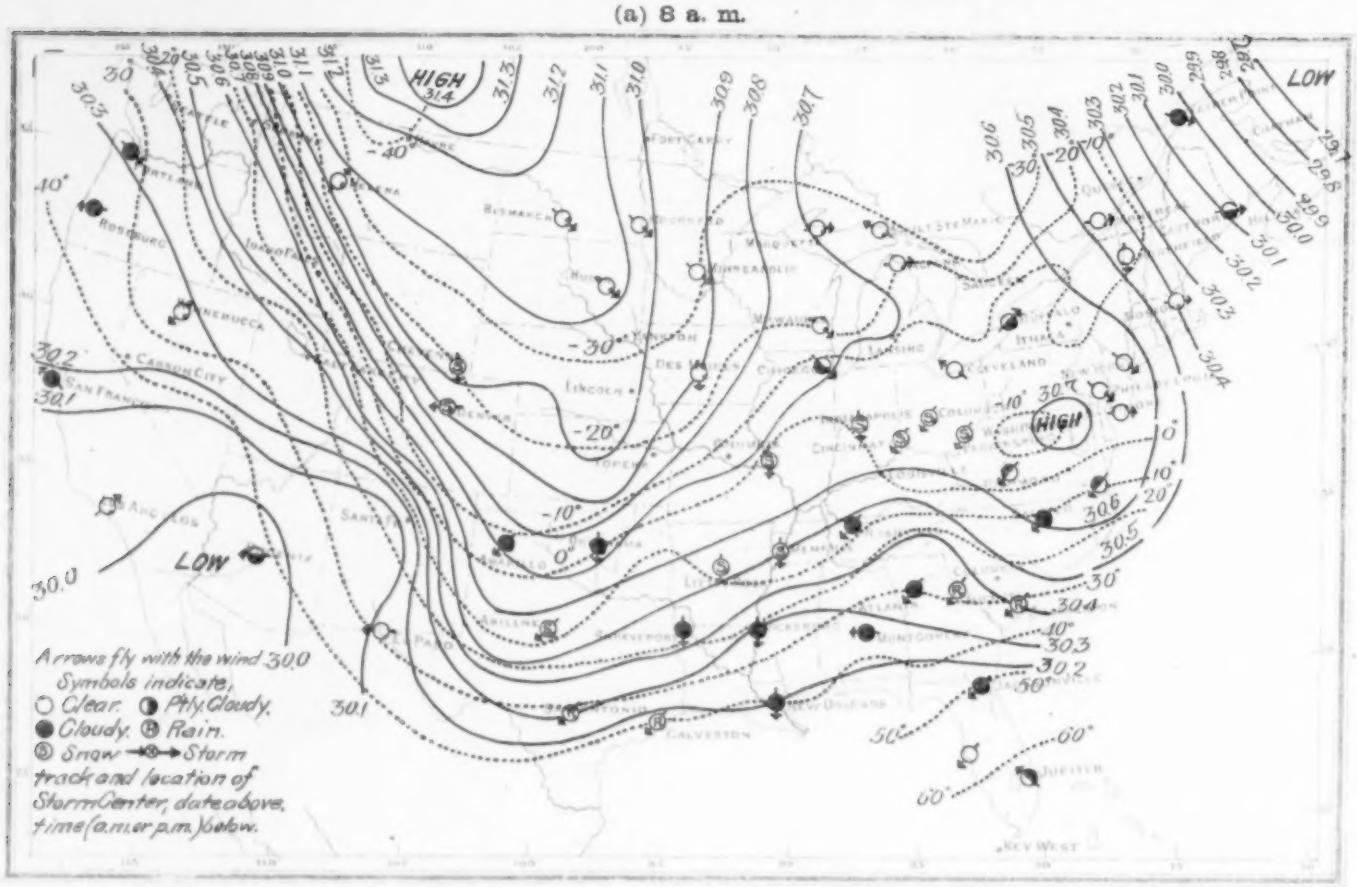


Chart X. Daily Weather Map of February 11, 1899.

(a) 8 a. m.



(b) 8 p. m.

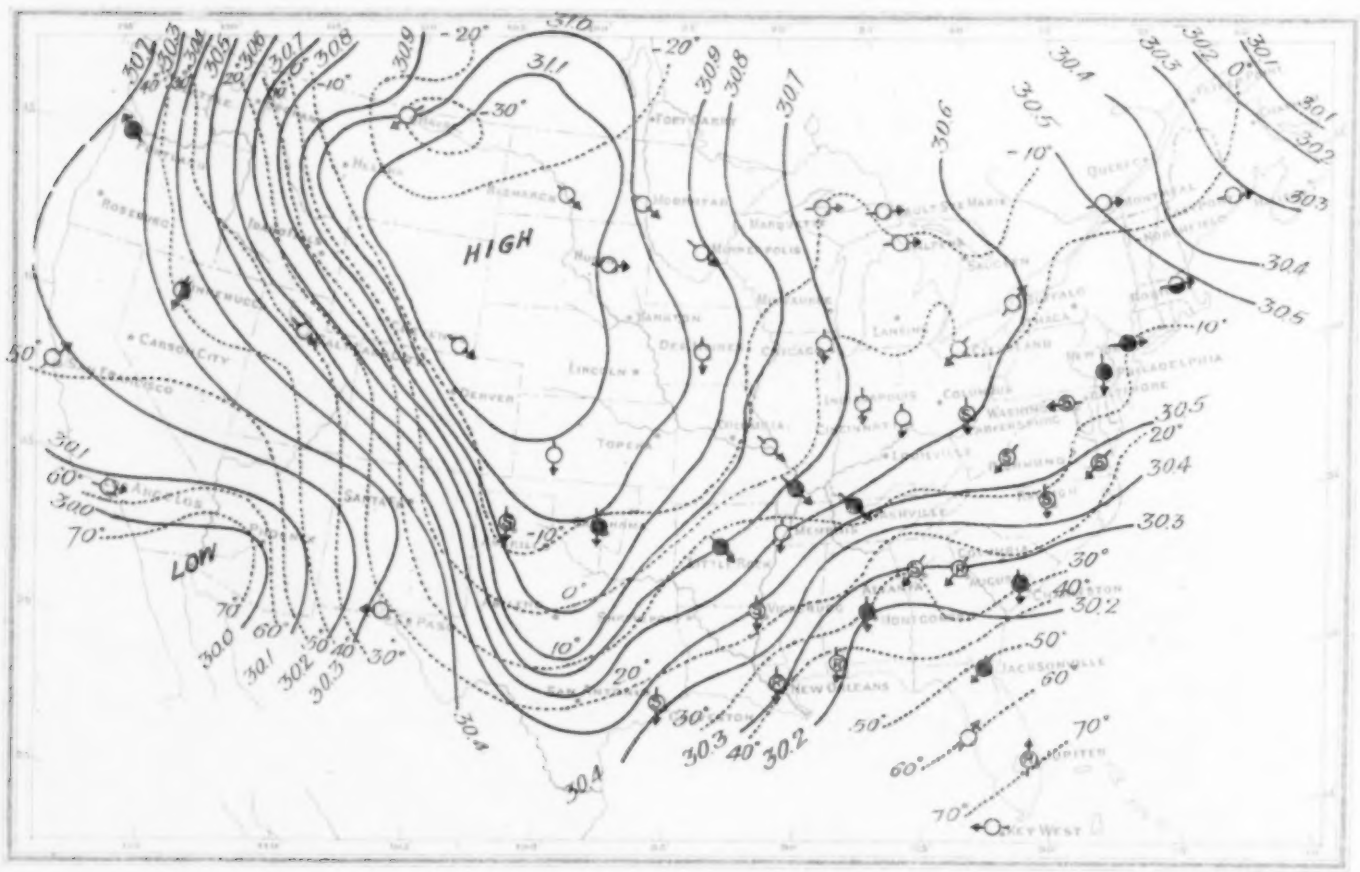
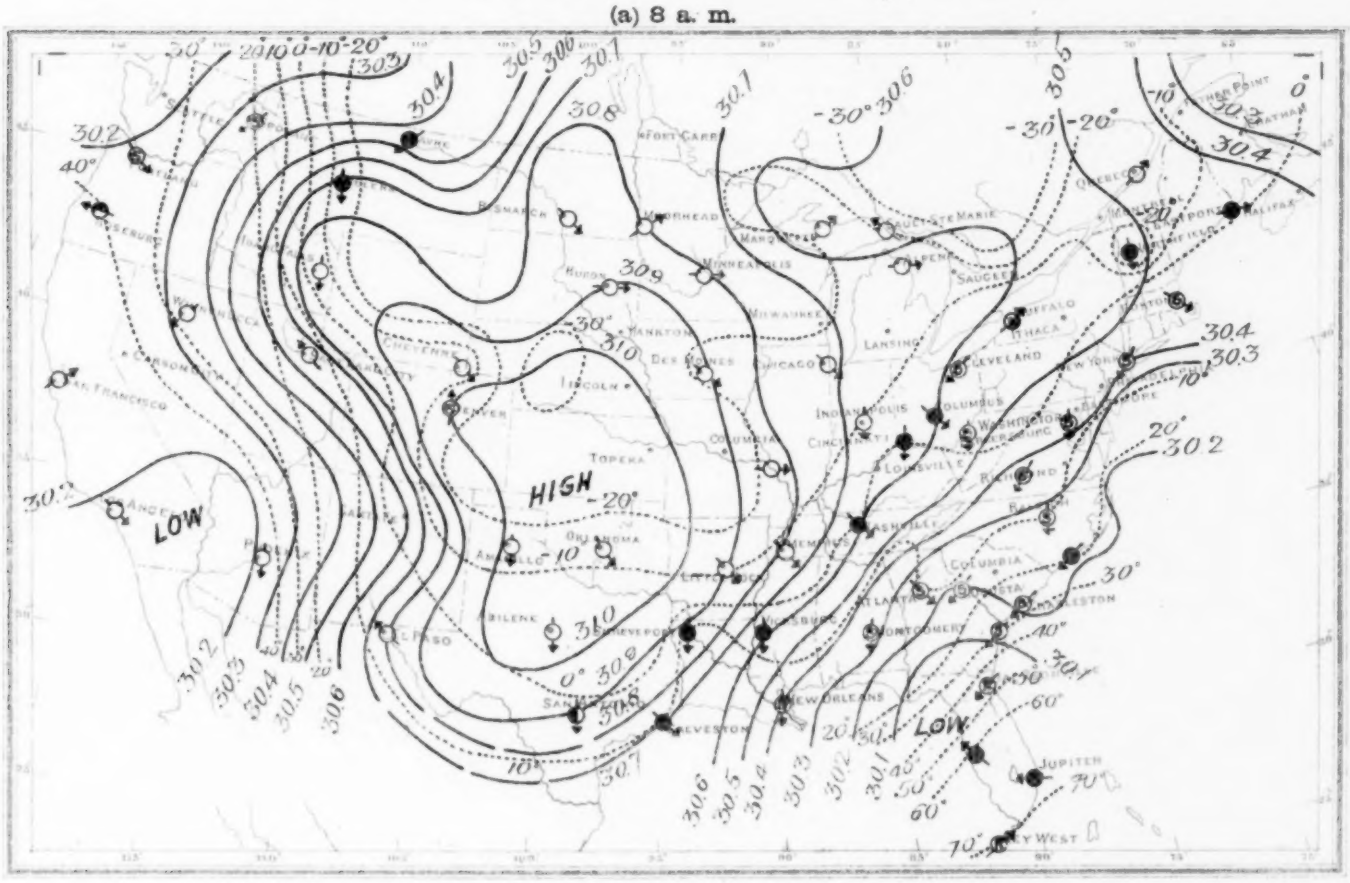


Chart XI. Daily Weather Map of February 12, 1899.

(a) 8 a. m.



(b) 8 p. m.

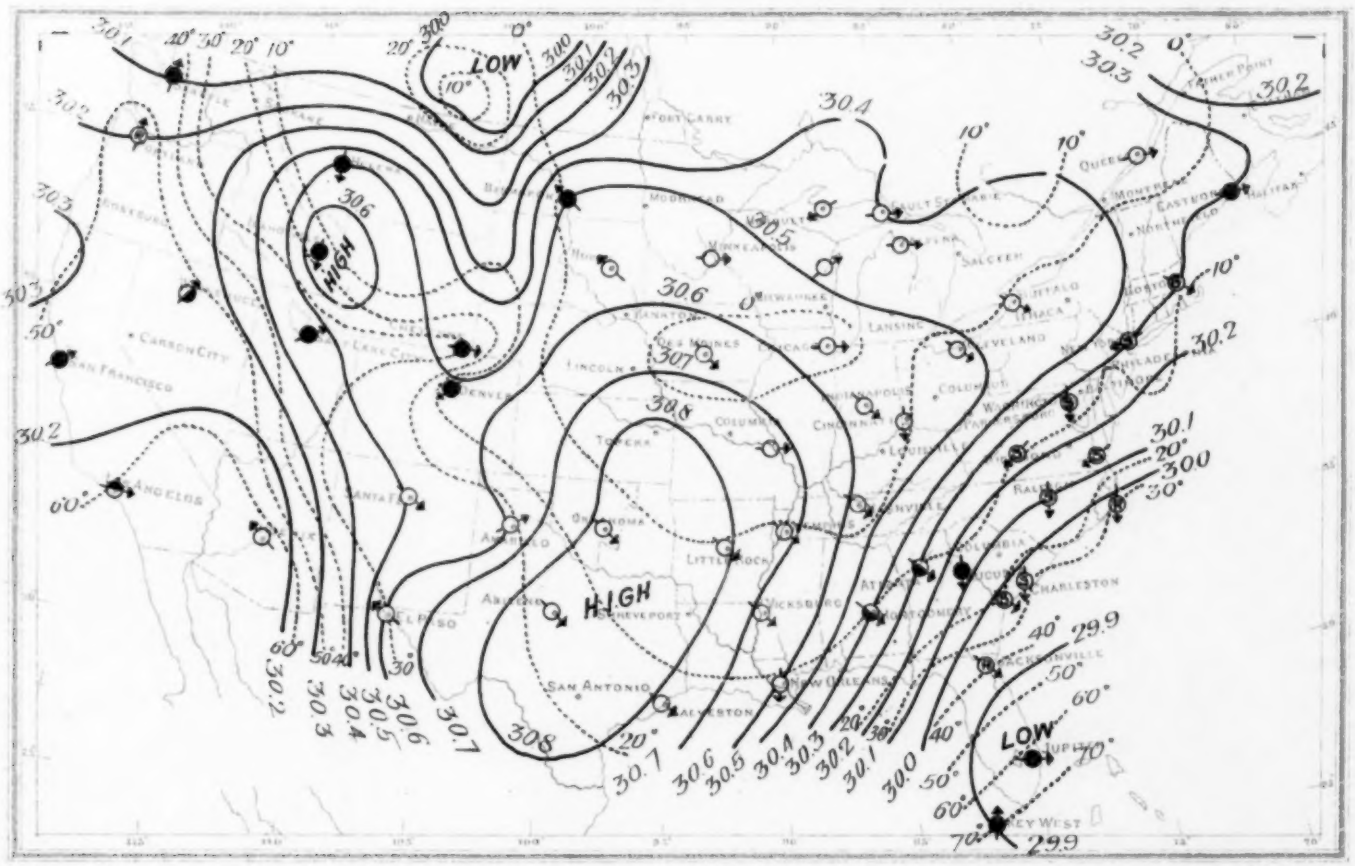
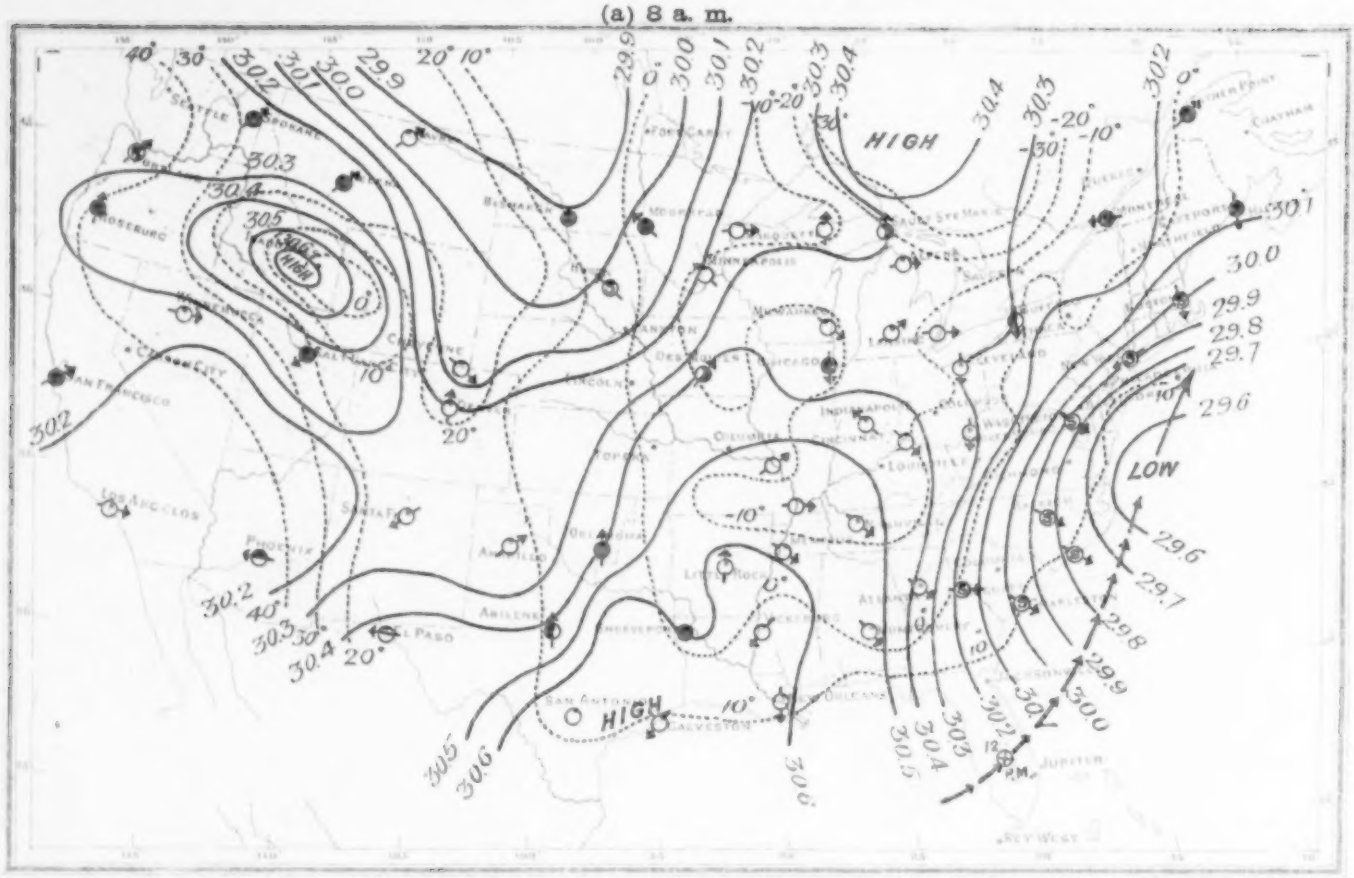


Chart XII. Daily Weather Map of February 13, 1899.

(a) 8 a. m.



(b) 8 p. m.

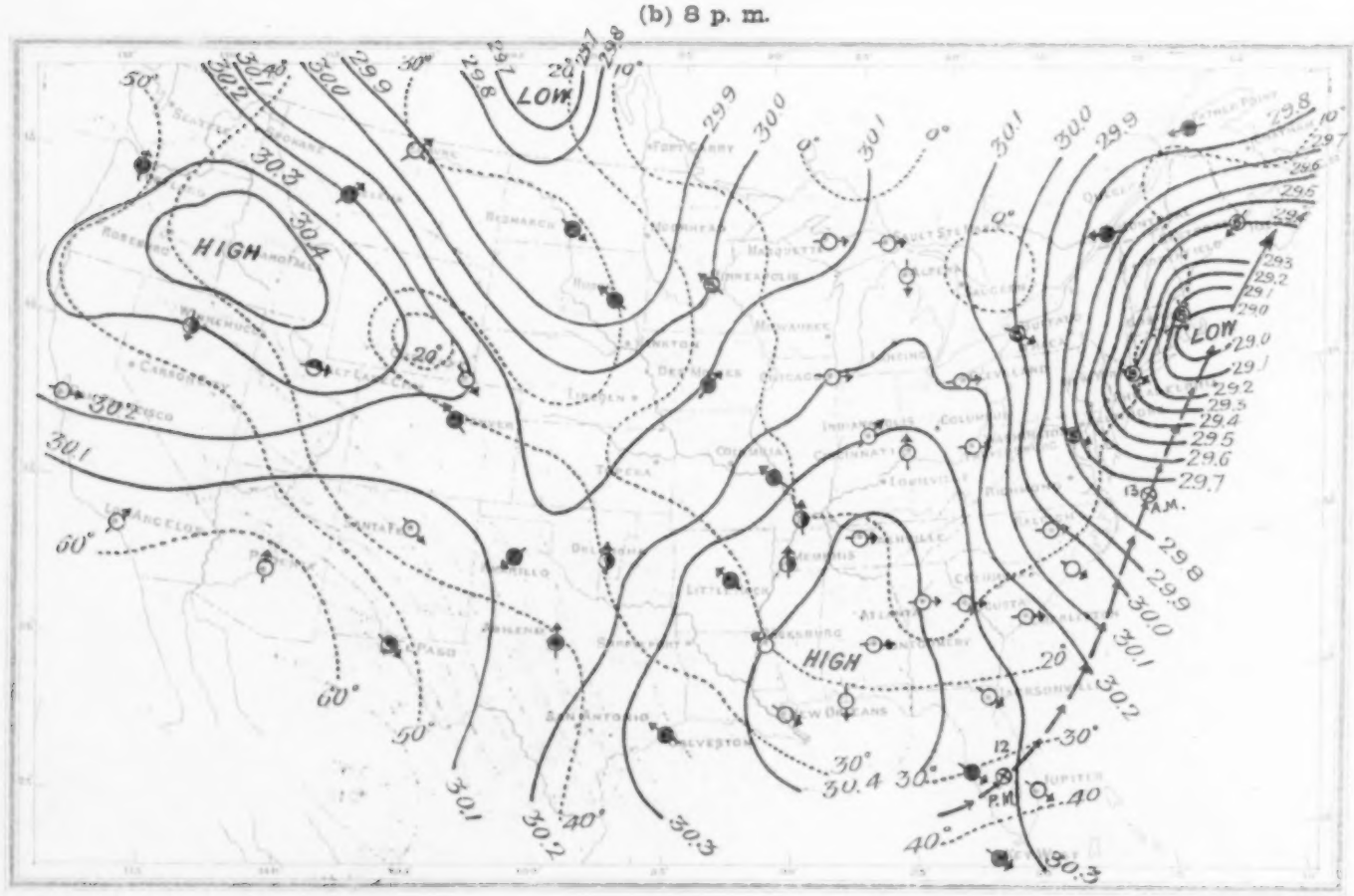
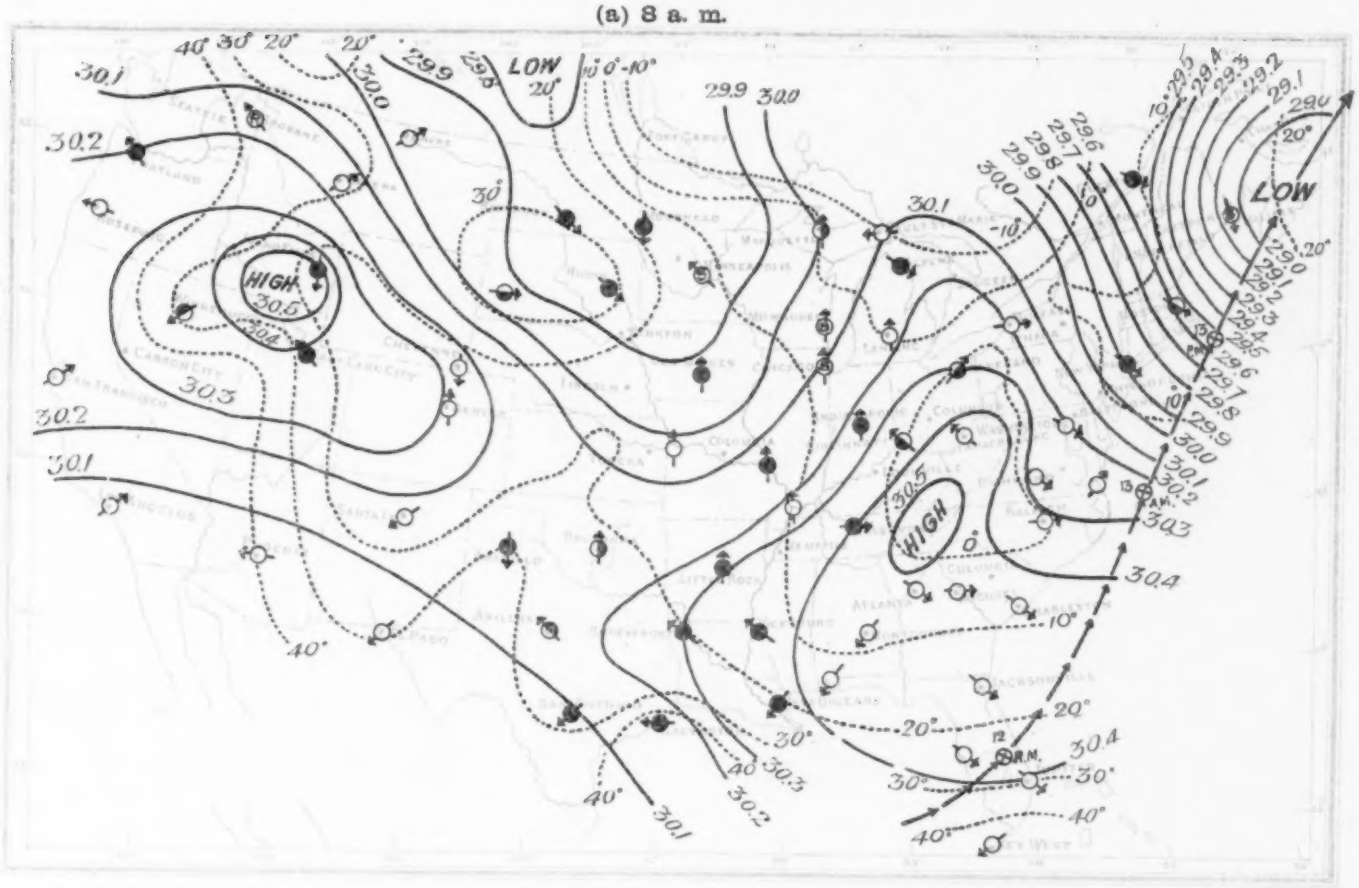


Chart XIII. Daily Weather Map of February 14, 1899.

(a) 8 a. m.



(b) 8 p. m.

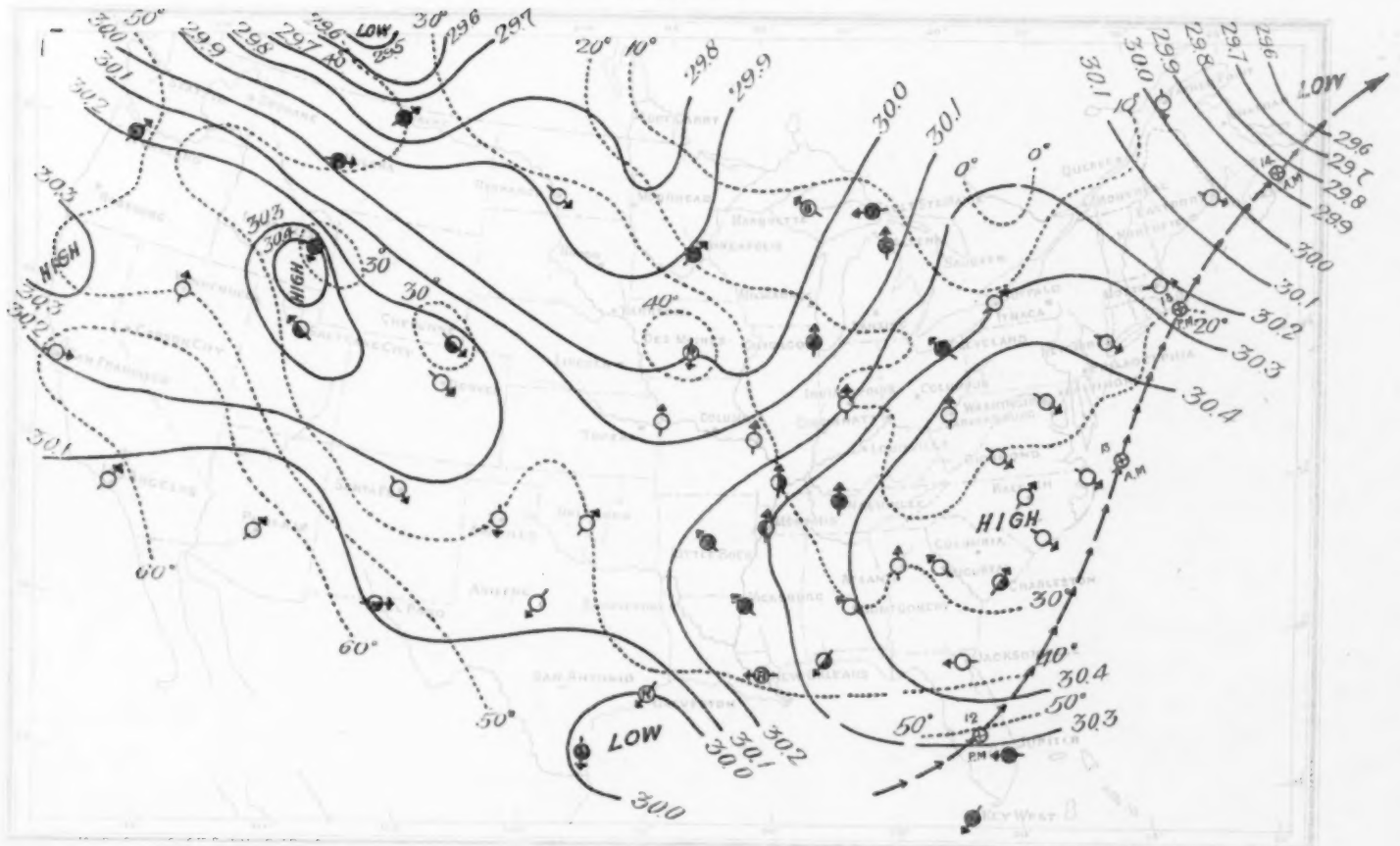


Plate I. Alto-cumulus Rolls. Washington, looking southward from the Weather Bureau, November 23, 1898, 8:25 a. m.

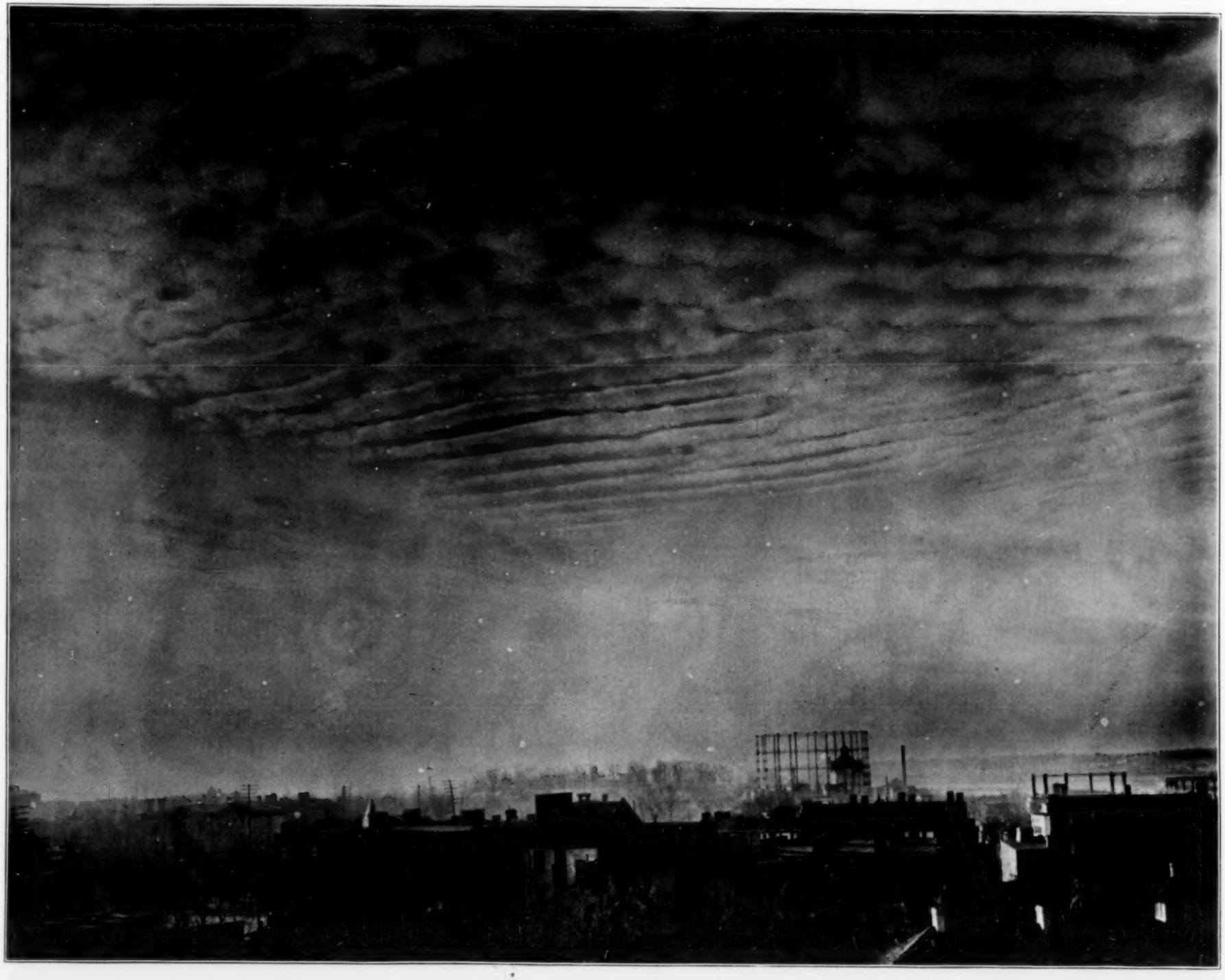


Plate II. Alto-cumulus Rolls. Washington, looking eastward from the Weather Bureau, November 23, 1898, 8:30 a. m.

Plate III. Alto-cumulus Rolls, with a Heavy Veil Beneath. Washington, looking south-southwestward from the Weather Bureau, November 23, 1898, 9:35 a. m.

Plate IV. Alto-cumulus Rolls, Dissipating. Washington, looking eastward from the Weather Bureau, November 23, 1898, 9:40 a. m.

Plate V. Alto-cumulus Rolls. Washington, looking eastward from the Weather Bureau, January 27, 1899, 8:55 a. m.

Plate VI. Alto-cumulus Rolls. Washington, looking eastward from the Weather Bureau, January 27, 1899, 9:02 a. m.